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RAILWAY GAZETTE**

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Transport Administration in Tropical Dependencies

By George V. O. Bulkeley, C.B.E., M.I.Mech.E.

With Chapters on Finance, Accounting, and Statistical Method

IN COLLABORATION WITH

Ernest J. Smith, F.C.I.S.

(formerly Chief Accountant, Nigerian Government Railway)

190 pages Medium 8vo. Full cloth

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THE RAILWAY GAZETTE

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The Government Changes

AFTER many delays, accompanied by rumours that the Prime Minister had found difficulties unusual in a British administration in effecting changes in the personnel of his Government, the revised list of Cabinet and other Ministers was published on Wednesday morning. As had been fully expected, the principal casualty from full Cabinet rank was Mr. Shinwell, although his transition to the War Office from the Ministry of Fuel & Power occasioned some surprise. In his place as Minister of Fuel & Power is Mr. Hugh Gaitskell, formerly Parliamentary Secretary to that Ministry. He will not have a seat in the Cabinet. That Ministry, in any event, is one which comes to some extent within the responsibility of Sir Stafford Cripps, in his recently enlarged sphere as Minister of Economic Affairs. Mr. John Wilmot has resigned, and in his place Mr. G. R. Strauss, formerly Under-Secretary to the Ministry of Transport, has been appointed Minister of Supply. Mr. P. J. Noel-Baker, previously Secretary of State for Air, is the new Secretary of State for Commonwealth Relations, and Mr. Arthur Henderson succeeds him at the Air Ministry. The new Parliamentary Secretary to the Ministry of Transport is Mr. Leonard James Callaghan, and Mr. A. G. Bottomley, who was formerly Under-Secretary of State for Commonwealth Relations, goes to the Board of Trade as Secretary for Overseas Trade in place of Mr. Harold Wilson, who had previously been appointed President of the Board of Trade when that post was vacated by Sir Stafford Cripps. Joint Parliamentary Secretaries to the Ministry of Supply are Major John Freeman and Mr. John Henry Jones. Rumours that a change in the Minister of Transport were about to be made have been falsified in the event, and Mr. Alfred Barnes, who has held office since the advent of the present administration, continues in his post. This effectively dispelled suggestions that he might be replaced by Mr. Shinwell. Two features of the new appointments are the relative youth of a number of the new Ministers, and also the trend away from those with long or intimate trade union associations.

* * *

Export Plans for the Engineering Industries

The Government's export programme calls for an increase in exports from the engineering industries from about £30 million a month in the last quarter of 1946 to £42 million a month in mid-1948 and £48 million a month at the end of the next year. This last figure is 270 per cent. of that for 1938, and indicates clearly the extent to which the burden of increasing exports has been placed on the engineering industries. When Mr. John Wilmot, Minister of Supply, met the Engineering Advisory Council last week he agreed that iron and steel and other raw material supplies would have to be increased to match the export targets, but he added that there was no possibility of any substantial advance in total deliveries. Increases in supplies of steel for export will have to be off-set by a restriction in their use from home production. Moreover, it is not possible to budget for an increase in output as a whole, except such as may arise from increased productivity and efficiency, for there is unlikely to be any great increase in the labour force. He assured the Council that in matters within Government control, such as raw material allocations, adequate provision would be made for the supply of common service items or components, particularly ball bearings, electric motors, and precision chain and such like, which are as vital to most forms of engineering as steel.

* * *

More Forms

Because in future allocations of steel and other raw materials to individual firms will be based on their actual performance for export, the Government intends to seek further information on how much individual firms are producing and exporting. In a number of cases production returns already are made on a voluntary basis. There are also export statistics for an industry as a whole in the Trade & Navigation Accounts, but this does not give information about individual firms. The Government has this matter under active consideration, and Mr. Wilmot indicated that probably it would not be possible to avoid exacting from individual firms periodic, probably quarterly, returns of their actual production and export performance. To guarantee as far as possible the reliability of

these statistics they would have to be statutory returns. He also undertook that the Government would endeavour to play its part in trade negotiations by removing obstacles to the entry of British goods to overseas countries. Much, however, necessarily is left to the resourcefulness and adaptability of the industry itself, and most important, to the quality, design, and price of the goods.

Transport Organisation

In the last issue of *The Sunday Times*, Mr. George Mills, former Divisional General Manager, Southern Area, L.N.E.R., contributed an article dealing with the "shape of things to come" in the transport sphere as a result of the creation of the British Transport Commission and the Railway Executive. Mr. Mills drew attention to the different bases existing in the organisation of the Great Western Railway and the Southern Railway as compared with the L.M.S.R. and the L.N.E.R. He pointed out that the indications were that in future the railways will be governed on a functional rather than an area basis, whereas of the latter the L.M.S.R. organisation was largely functional and the L.N.E.R. mainly geographical. As is pointed out in an editorial article elsewhere in this issue, in our view there are cogent reasons for maintaining railway systems as the basis of organisation in the new set-up, and that these are preferable to endeavouring to operate by regions. Any attempt to enforce administration by regions raises physical difficulties such as those resulting from the location of locomotive depots and works, carriage and wagon sheds, and such like.

Government Wages Policy

In so far as it can be claimed that the Government has a wages policy, the recent meeting between the Prime Minister, accompanied by the Minister of Labour, and a delegation from the General Council of the Trades Union Congress has resulted in the perpetuation of the *status quo*. The meeting took place after Mr. Isaacs, Minister of Labour, had sent a letter to the chairmen of both sides of a number of joint industrial councils, reminding them of the Prime Minister's statement in Parliament on August 5, in which he expressed the hope that, in view of the inflationary danger, no avoidable demands for wage increases would be pressed. In some trade union circles this letter was interpreted as Government intervention in wage negotiations, and some saw in it the threat of an ultimate dictation by the Government as to what the level of wages should be in any particular case. Mr. Attlee re-assured the T.U.C., and, according to the official statement, made it plain that the Government's policy continued to be that wages questions should be settled by the two sides of industry through the negotiating machinery.

Increased Prices of Steel

On August 1 the Minister of Supply announced an increase in steel prices of from 5 to 6 per cent. The reason given for the rise was the increases which have taken place in freight rates and in the price of coal and coke. Over 100 alterations were made in the schedule of prices for iron and steel products; examples are steel billets up 15s. a ton; heavy-steel products which are higher by 18s. 6d. a ton; re-rolled steel products which are in advance of 21s. a ton, and steel sheets which have been increased by 23s. 6d. a ton. The incidence of the higher steel prices coincided with the advance in railway freight charges to about 55 per cent. above pre-war levels, and also with increases in the price of coal from 6d. to 6s., according to the consuming district. The net effect of these three adjustments in basic costs inevitably must be reflected in higher prices over a wide range of products.

The New Fares

The increased fares which came into force on October 1 bring all main-line railway charges to 55 per cent. above pre-war level, and represent an increase of 16½ per cent. in the case of ordinary passenger fares. It is interesting to recall that, before the 1914 war the third-class 1d. a mile single was the custom, although there was no standardisation in method or scale of charging, and the issue of various forms of cheap

ticket had reached enormous proportions. An all-round 50 per cent. increase was made by the Board of Trade from January 1, 1917, to discourage travel, and a further increase of 25 per cent. from August 6, 1920, made the ordinary third-class fare 1½d. a mile. At grouping, on January 1, 1923, fares were standardised for the first time, and were reduced to a basic 1½d. a mile, but with returns at double the single rate. Monthly returns at 1d. a mile date from May, 1933. A 5 per cent. increase from October 1, 1937, left the basic single fare at 1-575d. and the monthly return at 1-05d. a mile at the outbreak of war. It is these figures that are now raised by a total of 55 per cent., making the new basic third-class single fare approximately 2-44d., and the monthly return about 1-63d. a mile, compared with about 2-1d. and 1-4d. during the past year. Thus, like the penny post of 1914, the penny-a-mile railway fare is now 2½d.

Development of the City & South London Railway

As the pioneer electrically-operated tube railway of the world, the City & South London Railway, of which the first section was opened in 1890, naturally had a more interesting career in many respects than subsequent tube railways which were able to enjoy the results of the experimental work of the pioneer. A fascinating study of this pioneer work was given last Saturday to the Electric Railway Society in a paper by Mr. T. S. Lascelles, who covered civil engineering construction, electric traction, traffic operation, signalling, and other aspects of this subject. The early adoption of rising and descending gradients at stations, to assist acceleration and retardation, may have been a surprise to some of his hearers, who regarded this as a more modern development. Electric locomotives, which were used until 1922, were necessitated by the small clearances of the original line, whilst unexpectedly heavy increase in traffic volume proved a great embarrassment and led, among other things, to the evolution of distinctive signalling to clear the trains with sufficient rapidity.

The Value of Long Fishplates

An editorial note in the November 22, 1946, issue of *The Railway Gazette* drew attention to the decision of British railways to abandon the use of short 9 in. and 10 in. fishplates in main-line work, and to revert to the previous 18 in. standard plates. Although the short plates made it possible to bring the joint sleepers closer together, the packing of these sleepers had been made more difficult, and as a result there had been an increase in the number of fractured rail-ends. In this connection a recent report to the annual meeting of the American Railway Engineering Association mentioned the interesting fact that in certain comparative road tests, 36 in. fishplates on 131 lb. per yd. flat-bottom rails on a Pennsylvania Railroad main line had had a service life half as long again as 24 in. fishplates with 112 lb. rail on the Santa Fe system. Similarly, rolling load laboratory tests conducted by the University of Illinois on 131 lb. rail joints have shown that longer life may be expected from 36 in. than from 24 in. fishplates. There has been little difference between the behaviour of full-bearing fishplates and those with controlled bearing at the head and base, or between head-free and head-contact fishplates of comparable weight and section; but the short-toe type of angle fishplate was specially commended for its good performance. So also was the practice of heat-treating the ends of rails to reduce battering at the joints; this has proved outstandingly successful in its results on both the Pennsylvania and Santa Fe road tests.

New Articulated Electric Locomotives in U.S.A.

The Great Northern Railroad, U.S.A., recently has acquired two very large articulated electric locomotives constructed at the Erie Works of the General Electric Company. Admittedly, their operating conditions are formidable: they are intended to work over the 75-mile stretch between Wenatchee, Wash., and Skykomish, which includes a tunnel 7-79 miles long (the longest in the Western Hemisphere) and a ruling gradient of 1 in 45. The tractive force (continuous rating) is 119,000 lb. at 15½ m.p.h.—the highest developed by any existing single-cab locomotive at that speed. Electric power is supplied at 11,000 volts, 25 cycles per second; the running gear design is based (mechani-

cally) on the older IC+C1 a.c. motor-generator locomotives of the Great Northern, but the new type, with twelve axles (six below each of the two articulated parts, to form a B-D+D-B type) gives a horsepower of 5,000 at rail as compared with 3,000 h.p. for the type now superseded. With driving wheels 42 in. diameter, the maximum safe speed is 65 m.p.h. The motors may be operated with series excitation up to 17 m.p.h. with the main traction generators in parallel (low-speed connection) and up to 44 m.p.h. with the two generators on each set in series (high-speed connection). Higher speeds are obtained in separate excitation with the traction generators in either the high-speed or low-speed connection. The characteristics of motor-generator locomotives make them especially suitable for starting heavy trains on steep gradients: moreover, regenerative braking can be conveniently arranged as an aid in safe operation and to economise in power.

Regions or Railway Systems?

DURING and since the war the title "British Railways" has become familiar both to traders and the travelling public. But in advertisements in the press under the heading of "British Railways" there appear the initials of the four main-line companies—G.W.R., L.M.S., L.N.E.R., and S.R.

We understand that from January 1 next, the date appointed for the nationalisation of British transport, "British Railways" is to be the general title. It will be confusing and unfortunate, and needlessly costly, if the familiar names of the four main-line railway systems are not also retained. In India, where the railways have long been state-owned, the titles of all the principal systems have been retained as was pointed out in our August 22 issue.

On January 1, the Government will acquire the undertakings of the four main-line companies and the London Passenger Transport Board under a Government-sponsored Public Authority, which will be a body corporate with perpetual succession and a common seal. The Chairmen and Boards of Directors of the railway companies will be replaced by the Minister of Transport, as supreme head, the British Transport Commission, the Railway Executive, the London Transport Executive, the Hotels Executive, and other Executives yet to be appointed.

Incidentally, in past discussions, advocates of nationalisation have stressed the saving to be effected by nationalisation in railway directors' remuneration. The total fees of the railway boards as published in the annual accounts amount to £116,713. Already the salaries to be paid to the Commission and the Executives and their staffs are exceeding that figure!

There is a prevalent idea that the railways will be placed under regional managers. There were indications of this possibility in the speeches at the recent Caledonian Railway Centenary luncheon in Glasgow. Such a scheme would no doubt appeal to politicians, and were there to be a Scottish region there would soon be a political pressure for a Welsh region. In our view regions would be a mistake. Railway systems, not railway regions, should be the basis. A geographical distribution of the British railway system is not a practical proposition. The main railway lines were built to connect one industrial town with another or with a port, serving also the intermediate country districts. Grouping has closed none of the alternate routes of competitive days. The Midland, North Western, and Great Central routes between London and Manchester have each to serve intermediate towns.

The Government is acquiring as going concerns four great railway properties (to say nothing of the undertaking of the London Passenger Transport Board) at a knock-out price. All the four main-line railways differ in their methods of management and operation. Quite apart from the fact that standardisation spells stagnation there is seldom a *best* way of doing anything, or a *best* machine or a *best* locomotive. The user knows that each method of operation and each machine has certain advantages and certain disadvantages. The user also knows from experience of the work he has to carry out, and the local conditions, which advantages and which disadvantages he prefers.

An efficiently run railway depends on the ability of six officers and their assistants, the General Manager, the Civil Engineer, the Mechanical Engineer, the Operating Superintendent, and the Goods and Passenger Managers. You cannot

have these six officers for geographical regions, but you can for railway systems. Therefore, we contend that if the British Transport Commission and the Railway Executive wish to make a success of nationalisation of "British Railways," as undoubtedly they do, instead of "welding the four main-line railways and the smaller ones that are left into one complete unit" they should follow the example of India and preserve the identity of the British railway systems as we know them today.

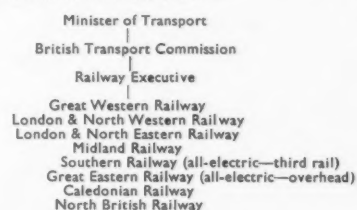
If it is decided to preserve the identity and existing organisations of the main-line railway systems, the Commission and the Executive are faced with a problem that will give them no headaches once they have selected the General Managers and Chief Officers, all under 50 years of age, for the main-line railway systems. Nor would a large headquarters staff and office accommodation be necessary. On January 1, 1948, the set up of British Railways would then be as follows:—



That would be the start off; involving no dislocation to the staff, the traders, and the travelling public. The familiar summer timetables would appear as usual next May except that the word "Company" would disappear therefrom. The four British railways would just be railways.

Soon, no doubt, the Commission and the Executive would turn their attention to the pseudo-political question of local autonomy and "decentralisation." It is to be hoped they will avoid anything in the nature of regional managers with no real authority and who would be in effect so many post offices. The Scottish and Welsh nationalistic aspirations might well be met by rectifying some of the mistakes made at the 1923 "grouping," when those responsible therefor would not face up to the financial difficulties involved by a physical truncation of any kind in the existing railway systems. With all the railways owned by the State this difficulty no longer exists. Some of the railway systems that ceased to be separate entities in 1923 might be resuscitated.

Instead of a Scottish region the Commission has at hand two ready-made railway systems to present to Scotland. All that has to be done is to allocate the Scottish systems of the L.M.S.R. and L.N.E.R. to two railway administrations, reviving the old titles of Caledonian Railway and North British Railway, the former managed from Glasgow and the latter from Edinburgh. Thus, in due course we may find the set-up of British Railways somewhat as follows:—



With few exceptions the first members of the British Transport Commission and the Railway Executive are well advanced in years, and the one certain event in everyone's life is likely to cause vacancies before long. In India the Government exercises control over all railways through the medium of the Railway Board (corresponding to the British Transport Commission and Railway Executive). Vacancies on the Indian Railway Board are filled by officers who have proved to be successful men in their individual administrations. The same practice should be followed here and with no political passengers. Having had their annual budgets approved, the General Managers of the individual Indian railways have wide powers for their day-to-day administration and the carrying out of new works projects. Each railway administration issues its own annual report, compiles its own statistics, and by a careful examination of the day-to-day working of other railways is able to create a spirit of healthy competition with other railway administrations.

Mr. T. W. Royle's Address to the Institute of Transport

ON another page we print an abstract of the Presidential address delivered by Mr. T. W. Royle to the Institute of Transport on October 6. In choosing "A New Era of Transport" as the title for his address, Mr. Royle wished to focus attention on the sweeping changes brought about in industry and transport during the transition from a war to a peace economy. One of the most important of these changes is the nationalisation of the major portion of the country's internal transport, but Mr. Royle suggested that many of the steps taken to alter the structure of industry and to increase production, especially for export, had a direct bearing on transport problems. He defined the target for the transport industry as "the provision of the most efficient, economical, and safe transit for passengers and goods which circumstances will permit." Users of transport should therefore state their requirements promptly so that the work involved could be planned to the best advantage.

In organising transport undertakings, over-centralisation should be avoided, and part of the price of progressive management was the constant review of all phases of activity, including methods of working—no matter how long-established. From his long experience of railway operation, Mr. Royle was able to quote some telling examples of the need for more detailed analysis of working arrangements than general statistics can supply.

Turning to the subject of theoretical training for management, Mr. Royle asked whether the Institute could spread its facilities far enough to reach all grades of transport staff. He evidently felt that the existing training schemes of the railways and other transport concerns might be combined with the Institute's courses of education, and, in our opinion, this question ought to be investigated thoroughly. Referring next to the Urwick Committee's report on training for management, Mr. Royle agreed with the finding that opportunities to obtain the higher posts in business should be open to men trained in the school of experience. Written examinations, he emphasised, could not measure the qualities which make up "leadership."

Mr. Royle concluded his survey of the present-day situation by alluding to one or two subjects to which the Institute might give thought and so possibly assist in building up a new transport structure. He passed in quick review ports, waterways, road and rail co-ordination, and air transport, as well as touching again on the need for methods of training staff which would open wider the door for promotion. Mr. Royle aimed throughout at inspiring thought on matters concerning the new era of transport on which we are entering.

Burma Railways

THE report of the Burma Railway Board for the year from October 1, 1945, to September 30, 1946, which we have received from the Chief Railway Commissioner, Brigadier J. C. B. Wakeford, is the first to be issued since the country was occupied by the Japanese, and the Government of Burma evacuated to India in May, 1942. Although the audited accounts are not yet available, the report is valuable as a record of achievement in restoring railway services in Burma since the liberation. Railway staff returned to the country as part of the Civil Affairs Service (Burma) Organisation, an arrangement which enabled them to be fed and clothed on a military basis. Meanwhile, plans were being made for the civilian administration to take charge, and this took effect on January 1, 1946. The Civil Affairs Service (Burma) Organisation closed down on March 31, 1946, and the Railway Board was reconstituted in Burma by the Governor with effect from April 1 last year. It consists of a President, eight members, and a Secretary.

Strenuous efforts by railwaymen in Burma produced early results in the restoration of transport facilities. By January 1, 1946, the total route-mileage open was 581, but by September 30 this figure had been increased to 1,297. The report emphasises the fact that the task of rehabilitating the railways in Burma is something hard for a layman to appreciate, for practically all bridges had been destroyed; signalling and safety equipment was neglected or non-existent; and locomotives and rolling stock severely damaged. Against 9,100 goods vehicles of all

types available before the war, only 2,900 remained in January, 1946, and many of these were in bad repair. Coaching stock was in an even worse position, for on January 1 last year only 10 vehicles were fit to run, as compared with 760 coaches in pre-war days. Serviceable locomotives of the Burma Railways totalled only 59, whereas 369 were in operation before the war. By the time the civil administration took control, the locomotive stock had been increased to 84 by the receipt of 19 American "McArthur" class engines and six "F" class engines from India. The report tabulates the increases in train-mileage achieved during 1946, and compares the figures with 1938-39 as shown below:—

	DAILY TRAIN-MILEAGE		1938-39
	February, 1946	August, 1946	
Passenger	215	1,395	3,800
Mixed	1,488	1,081	11,265
Goods	1,323	2,931	5,241

In the period covered by the report there was a change in the flow of traffic compared with pre-war days, the majority of loaded wagons going up-country from Rangoon instead of in the reverse direction as before the war. By September, 1946, there was an approach towards a balance in up and down loaded traffic, the proportions of loaded to total wagons in the two directions being approximately 80 per cent. on up trains and 60 per cent. on down trains, although these figures were effected by the general strike, and the previous proportions were about 86 per cent. and 30 per cent. respectively. Although equality of loading would be advantageous to economical railway operation, the report points out that it would not endure for long, as it would be upset by a revival of export trade and a decline in imports for rehabilitation.

Traffic figures for the period from January to September, 1946 (subject to audit), showed goods receipts of Rs. 21,744,993, to which military traffic contributed 47.6 per cent. In passenger traffic, however, there has been a greater swing from military to public receipts, the January total of Rs. 5,962,836 comprising Rs. 2,363,744 from military traffic and Rs. 3,599,092 from the public. In fact, whereas in January, 1946, military coaching earnings were over five times those in respect of public traffic, by August public coaching earnings were nearly four times as much as those from military services. There has been a trend towards longer journeys by members of the public, brought about by the return of displaced persons. An indefinite continuance of this tendency, therefore, must not be expected.

A week before the end of the period covered by the report, on September 23, 1946, a railway strike broke out, and the entire railway organisation, except for the officers and a handful of staff, ceased work. This strike is estimated to have caused a reduction in railway revenue of about Rs. 75,000 daily, but it had also a profound effect on the morale and contentment of the staff. This movement was part of a general strike, largely political in character, and led by a union to which the Burma Railway Workers' Union is affiliated. Considerable unrest is foreseen if railway employees are to be brought out on strike by an organisation which has no responsibilities towards the public, and appears to be a political body rather than an industrial union.

The First 4-8-4 on the New York Central

THE appearance of the first 4-8-4 locomotive on the New York Central & Hudson River Railroad has been awaited with considerable interest in American locomotive circles, and with good reason, for the new design includes a number of remarkable features which are well worthy of attention. The principal matter of note lies in the wheel arrangement itself, as it would have been an easy matter to have followed the lead of the Pennsylvania Railroad in providing for a new type for the heaviest duties, and to have evolved a "duplex" design instead of remaining faithful to eight coupled wheels. The new 4-8-4s, which will be known as class "S1a," form the first break-away from a long line of 4-8-2s, comprising four classes, which were originally built for freight service and were later, with the aid of various refinements, adapted for high-speed passenger traffic as such.

The 4-8-2s were themselves notable machines, and have developed up to 5,400 i.h.p. during dynamometer car tests, but it is expected that the output of the new 4-8-4 will exceed 6,000 i.h.p. Some interesting trials are being carried out on

the latter to assess the effect of driving-wheel diameter on performance. Two complete sets of driving wheels, 75 in. and 79 in. respectively in diameter, were provided when the engine was built. For the first few months of its existence the new locomotive ran with the smaller set of wheels, but in July, 1945, the larger size was substituted and the engine was put to work the "Commodore Vanderbilt" train between Marmon and Chicago—a heavy train with a number of stops, and considered to be a hard run. So far, the 4-8-4, according to our contemporary, the *Railway Age*, is said to have made easy work of it.

The general dimensions of this locomotive, which bears the running number 6000, have not been approached in this country—nor could they be under the existing loading gauge and permanent way restrictions. The boiler, 8 ft. 4 in. in dia. outside the third course, is 19 ft. long between tube-plates; the firebox is provided with a grate having a length of 12 ft. 7½ in. and an area of 100 sq. ft., and the combustion chamber is 7 ft. 8½ in. long.

The fuel used in the locomotive is soft coal. Five 4-in. arch tubes, 177 4-in. flues, and 55 2½-in. tubes contribute towards a total evaporative surface of 4,632 sq. ft. The superheating surface is 1,977 sq. ft. Pressed to 275 lb. per sq. in. with the 75-in. driving wheels in use (290 lb. with the 79-in. drivers), the boiler is made in three telescopic rings, the maximum thickness of the plates being 1 in. The great height of the centre line above rail level (about 10 ft. 8 in.) precluded the use of a steam dome; so the 11-in. internal steam pipe is provided with 28 slots across the top, 1-in. wide, with a clear chord length of 5 in. Baffle plates have been fitted below these openings in order to prevent the carry-over of moisture.

The inside firebox is welded throughout. The circumferential wrapper and throat-sheet seams are seal-welded, as are the butt joints of the shell courses at the ends of the longitudinal seams. The usual seal welding has been made in the vertical seams of the outside firebox above the foundation ring.

The foundation of the locomotive is a cast-steel bed which includes the two 25-in. by 32-in. cylinders, the air pump bracket, and the main reservoir for the air brakes. The driving wheels are mounted on hollow-bored axles and the roller bearing assemblies are of the Timken split-housing type with two-roll bearings. A controlled lateral motion of ⅜ in. and ⅝ in. (each side) is allowed to the front and intermediate pairs of driving wheels respectively. The wheels of both leading and trailing bogies are provided with Timken roller-bearing boxes.

The locomotive is driven by a complete set of Timken roller-bearing rods, including the bearings on the gudgeon pins and the four crankpins. The roller bearings are mounted on the crankpins; and the rods, with spun-brass liners, are slipped over the outside bearing races. There are two coupling rods on each side of the engine between the middle pairs of coupled wheels, but single rods continue from these to the two end pairs of coupled wheels. Hollow piston rods and aluminium crosshead shoes help to reduce the reciprocating weights. The slide bars are not fastened to the rear of the cylinder casting.

Piston valves 14 in. in dia. distribute the steam to the cylinders, and are actuated by Baker valve gear of particularly neat and elegant appearance. This valve gear, which is provided with needle bearings throughout, gives a maximum travel of 8½ in. The tractive effort is rated at 62,330 lb. with 75-in. drivers and 275 lb. per sq. in. pressure, and 62,400 lb. with 79-in. drivers and 290 lb. per sq. in. pressure. The adhesive weight is 275,000 lb. (122.6 tons) and the total weight of the engine 471,000 lb. (211.5 tons); the adhesive weight divided by the tractive effort gives a factor of 4.41.

From March to the middle of August, 1945, No. 6000 had run some 60,000 miles in traffic; it was later withdrawn for complete boiler performance tests, which were followed by road tests to determine its maximum capacity and efficiency. Meanwhile, twenty-five more locomotives of the type, with slight modification to the combustion chamber length (and consequently of flue and tube lengths also) were put in service, followed by a further locomotive having the Franklin system of steam distribution.

Ashford Works Centenary

IN pre-grouping days, Ashford was to the South Eastern & Chatham Railway what Crewe was to the London & North Western Railway, although, of course, on a much smaller scale, but, nevertheless, similarly with its own traditions. In February, 1846, the directors of the South Eastern Railway decided to buy 185 acres for £21,000 on which to build a "locomotive establishment" on the Folkestone side of Ashford. Work was put in hand rapidly, and from the beginning of 1847 a limited amount of locomotive repair and maintenance work took place. At the autumn half-yearly meeting of the South Eastern Railway in 1847, the directors were able to announce officially the transfer of the railway locomotive depot from its temporary site at New Cross to Ashford. This is the event which has been made the subject of centenary celebrations by the Southern Railway referred to elsewhere in this issue.

Heretofore, the locomotives had been ordered from outside contractors, without exception, but in 1848 work was begun on the first locomotive actually to be completed at the new works. It was a small vertical-boilered engine officially designated No. 126 and designed for hauling the directors and Chief Engineer on inspection trips. The autumn of the year 1850 saw the establishment of the Carriage & Wagon Department at Ashford, by which time the adjacent railway village had been extended to comprise 132 houses. This village at first was known as Alfred Town, but later it became Ashford New Town. By the end of 1851, Ashford Works was supporting nearly 3,000 persons, including the workmen and their families. In 1853 the works began turning out its first standard design locomotives. At this period, the destinies of the locomotive department were in the hands of James I'Anson Cudworth, who selected much of the equipment for the works.

Cudworth resigned in 1876 as a result of his directors inviting Ramsbottom of the L.N.W.R. to design a class of passenger engine. He was succeeded somewhat hastily by A. M. Watkin, the son of the Chairman, Sir Edward Watkin, but his reign lasted only until the appointment of R. C. Mansell in 1877. Mansell had been Carriage & Wagon Superintendent and had devised the Mansell wheel for carriage stock, which was one of the successful Ashford innovations. Mansell's appointment as Locomotive Superintendent was admittedly an interim one, and he was succeeded in 1878 by James Stirling, who held office until 1898, when the establishment of the South Eastern & Chatham Railway Companies' Managing Committee resulted in the appointment of H. S. Wainwright as Locomotive Superintendent of the combined undertakings. Wainwright was succeeded in 1913 by R. E. Maunsell, who was given the title of Chief Mechanical Engineer, remained in office until grouping in 1923, and then became C.M.E. of the Southern Railway.

A considerable portion of the Ashford traditions was developed during the reign of James Stirling (brother of Patrick Stirling of Great Northern Railway fame). His 7-ft. bogie express No. 240 won a gold medal at the 1889 Paris Exhibition, but its many excellent qualities did not include an all-over cab for the crew. Soon after the working amalgamation with the L.C.D.R., the Longhedge Works of the latter passed over new construction to Ashford, and later repairs also, so that considerable extensions were necessary at the Ashford Works, which were taken in hand in 1909, and increased the capacity by nearly 50 per cent. New locomotive construction continued through grouping, and until 1936. Thence the resources of the works were devoted wholly to the manufacture of parts and to repair, until the recent war caused building to be resumed. Mr. Bulleid's "Austerity" 0-6-0 goods engines became a familiar feature of the erecting shops, and fourteen 2-8-0 war-design L.M.S.R. engines were built in twelve months. A new enterprise for Ashford was begun in 1937 with work on the mechanical parts for the first three diesel-electric shunting engines of the Southern Railway. Four years later similar constructional work was completed for the first two main-line electric locomotives of the company. These are but some of the highlights of the fascinating story of the Ashford Works, which are told in greater detail in a new publication* of the Southern Railway.

* "Ashford Works Centenary, 1847-1947." London: Southern Railway. Watlington, S.E.1. 9½ in. x 7 in. 48 pp. + folding plate. Fully illustrated. Price 2s.

LETTERS TO THE EDITOR

(The Editor is not responsible for the opinions of correspondents)

Railway Accident Reports

390, Wakefield Road,
Huddersfield, September 12

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In your reference on page 285 of the September 12 issue to the Chief Inspecting Officer's annual report, the Lichfield accident is mentioned in a manner that suggests that the inquiry established the cause of the accident and explained everything perfectly.

This, I think, is deplorable because the inquiry actually failed completely in that respect. It merely produced conjectured theories, all of which involved untenable assumptions. The evidence pointed to a mechanical failure of a nature that has not been brought to light. On that account the Lichfield accident should be recorded and recognised as one of a distinctive and unusually disturbing character, and the inquiry should not be dismissed as if it had been pure routine.

Yours faithfully,

W. A. TUPLIN

[We are far from regarding any accident inquiry as pure routine. If our correspondent will refer to our issue for June 7, 1946, where we dealt at length with the Lichfield case, he will find that we gave it the most serious consideration. We do not share in the least Dr. Tuplin's estimate of the character of Lt.-Colonel Woodhouse's investigation into the accident.—Ed., R.G.]

A Remarkable Railway Renaissance

London, S.W. September 17

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—In your December 20 issue you printed a letter which expressed doubts about the wisdom of spending \$25 million on the Chicago, Indianapolis & Louisville, a railway operating 541 route-miles in the Central Eastern Region of the U.S.A. Since that date the "Monon," as the railway is called for short, has been much in the news. It has celebrated its centenary, installed diesel locomotives and displayed the "Train of Tomorrow" to an admiring public. The President of the "Monon," Mr. John W. Barriger, says that his railway "is beginning to roll into high gear." The statement of railway revenues and expenses for the first half of this year shows that the reborn railway is likewise in danger of rolling into debt.

In 1945 the "Monon" had a net railway operating income of \$1,717,000, thanks to war traffic and low expenditure. Last year it had a deficit of \$595,000. The first half of 1947 brought a further deficit of \$261,000, although freight revenue was 51 per cent. higher and passenger revenue 47 per cent. higher than in the first six months of 1946. The explanation is that the "Monon's" operating expenses were up by 43 per cent. The total expenses of all the railways in the Central Eastern group increased by only 8 per cent., with the result that they had a surplus of \$48,614,000 in place of a deficit of \$10,740,000 at June 30, 1946. The group as a whole has turned the corner, but, so far, all Mr. Barriger's showmanship has failed to earn a return from his ambitious schemes.

Yours faithfully,

SCEPTIC

The "Devon Belle"

London, September 29

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—"East Anglian's" letter in the September 26 issue of your publication pointing out that sleeping cars cannot be justified commercially, and that the ordinary traveller subsidises the transport of a few in luxury, leads me to point out that a similar state of affairs exists in the case of Pullman cars. I refer, in particular, to the "Devon Belle."

Consider the return journey London-Exeter. Monthly returns are 60s. 5d. first class and 40s. 3d. third class; while the Pullman supplements for the return journey are 12s. and 7s. respectively. The 12-coach train (including observation car) seats 92 first class and 240 third class passengers. Total revenue, therefore, equals (92 x 72s. 5d.) plus (240 x 47s. 3d.) or £900. The total weight is 12 x 40 = 480 tons tare or 500 tons loaded. The cost of working this weight of Pullmans to Exeter and back may be assumed to be equal to that of working the same weight of ordinary stock over the same route. Five hundred tons of the latter would be made up of 4½ 3-coach sets of the latest design as recently described by you

(each unit weighs 100 tons tare) and the seating would be 112 first class and 560 third class passengers. Revenue would be (112 x 60s. 5d.) plus (560 x 40s. 3d.) = £1,464, i.e., over £500 more than that of the "Devon Belle."

I would emphasise that this calculation makes no allowance for standing passengers in the ordinary stock, though they certainly would be carried in the summer months during which the "Devon Belle" ran, being, however, positively excluded from the latter. Further, the cost of running the "Devon Belle" would include also the wages of the Pullman car attendants though these might be covered by catering profits.

It is interesting to note that to equate the revenue from the "Devon Belle" to that of the train of ordinary stock, the Pullman supplement would have to be multiplied by 5, i.e., 30s. first class and 17s. 6d. third class, for the single journey.

Yours faithfully,

SOUTHERNER

[The Southern Railway is desperately short of stock due to bombing. Pullman stock, belonging to the Pullman Company, existed, and could be used in this way. Many of the passengers by the Pullman cars never would travel by ordinary coaches.—Ed., R.G.]

Unification of Railways

73, Fordingbridge Road,

Eastney, Portsmouth. October 1

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I was very interested in your correspondent's letter on this subject contained in your issue of September 5. I am a "railway enthusiast," and have had many occasions of discussing many aspects of railway operation with railwaymen of all grades.

I feel that a lot may be lost, especially amongst locomotive men, if the railways are "completely unified." For instance, I toured Scotland recently and locomotive men I spoke to, when they found I came from the South, were very keen to hear all about the latest developments on the G.W.R. and Southern Railway; and in particular about the new "County" and "West Country" classes, but very often only to terminate the discussion by saying: "I bet that they have nothing down there like our Class 5s," or similar remark!

A surprising number of railwaymen seems quite shocked at the idea that nationalisation means that the four main-line railways may become one. The main object and feature of nationalisation, according to them, is to dispose of the wicked shareholder and thus get an increase in wages!

As a sidelight it is interesting to note that the Army, which is very much a nationalised organisation, finds it most desirable from the point of view of efficiency to maintain the individualities and traditions of the various regiments.

Yours faithfully,

A. MERRICK

Power Reverse Gears

15, Bellevue Crescent,

Ayr, Scotland. October 1

TO THE EDITOR OF THE RAILWAY GAZETTE

SIR,—I have read with great interest the correspondence in your columns on the above subject. I am very pleased that two of your contributors have spoken appreciatively of the gear designed by Mr. James Stirling. I can bear testimony to its efficiency on the engines of the Glasgow & South Western Railway. It was simple, light, accessible, and easily maintained. The driver could fill the oil cylinder without rising from his seat in the cab, and I am doubtful if any Stirling reverser required fitter's attention as much as once in a year.

Later, we got the Drummond reverser and the Whitelegg adaptation of it. They were not so good. Controls were long and rods were apt to whip. The gears were often slow in "answering the helm." With the departure from the position in the cab the magic was lost.

Why trouble about the modern driver's opinion of power reverse gears? He probably has encountered only a few specimens, ill-designed and out of repair. And the veteran is in little better case. It is a sobering thought that all the vast concourse of drivers on the L.N.W., Midland, Great Northern, and Great Western Railways retired, died, and went to their graves without knowledge of this benefit to engineering civilisation.

Why not proceed logically to abolish self-starters on buses and lorries? How much work this would save for the poor harassed fitter; but would the abolishers survive the storm they raised? I doubt it.

Yours faithfully,

DAVID L. SMITH

The Scrap Heap

L.M.S.R. ROTHERHAM D.O.M. OFFICE

After a chequered career in the course of which it has served the successive rôles of railway station, post office, labour exchange, and military headquarters, a building in Westgate, Rotherham (Yorks.), has reverted again to railway use with the establishment of the L.M.S.R. District Operating Manager's offices there. Between 1838 and about 1875, the building was used as a railway station, having been the original terminus of the Sheffield & Rotherham Railway. From 1877 until 1906 it was the Rotherham Post Office; from then until 1916, the premises were occupied by a brewer's merchant; and between 1918 and 1938, the Office of Works held the tenancy for purposes of a labour exchange. From 1939 until 1946 the premises were rented by the West Riding of Yorkshire T.A. Association, and since the expiry of this tenancy the L.M.S.R. has "moved in" again.

100 YEARS AGO

From THE RAILWAY TIMES, Oct. 9, 1847

SOUTH EASTERN RAILWAY.—
ELECTRIC TELEGRAPH. — Messages forwarded to and from the following towns:—

Reigate	Ashford	Deal
Tunbridge	Canterbury	Folkstone
Maidstone	Ramsgate	Dover
Margate		

The scale of terms may be had at the office.

G. S. HERBERT, Secretary.

London terminus, October 5, 1847.

MIDLAND RAILWAY.—The Midland Railway Company are prepared to receive **LOANS**, on security of their Debentures, for periods of three, five, or seven years, in sums of £1,000 each and upwards, at interest after the rate of £6 per cent. per annum, payable half-yearly.

Application to be made to the Secretary, at the Company's Office, Derby.

By order, J. F. BELL, Secretary.

October 2, 1846.

SUB-POSTMASTERS

Talking about summer holidays to a sub-Postmaster over the week-end, I was startled to learn that neither he, nor most of the other 18,000 sub-Postmasters in the country, will get a holiday this year, or next year, or as far as they can see, any other year. Part of a sub-Postmaster's contract is that his Post Office should never close, except at Bank Holidays. If he wants to go away, he may find a substitute, but he remains of course responsible. He can seldom find a substitute sufficiently experienced to manage the complexity of the accounts, which now include all the business of Old Age Pensions, Family Allowances, and Insurance cards. To go on a holiday often means coming back to find that mistakes have been made; sometimes there is a deficit of £30 or more, which has to be made good immediately out of the sub-Postmaster's own pocket. The sub-Postmaster with friends who often stay with him and help in the shop can delegate with reasonable confidence. But those are the fortunate few. The remainder decide to stay at home or acquire an Anxiety Neurosis speculating on the competence of the "temporary" left in charge. Compensations, of course, are considerable. In villages, the Post Office counter brings customers to the shop. In towns, the profits in the Post Office business, on a commission basis, frequently bring in £700 to £1,000 a year. The possibilities lure the unsuspecting into a life of non-stop working years. How to provide an occasional rest for the kindly couple who preside over the

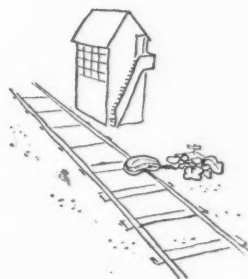
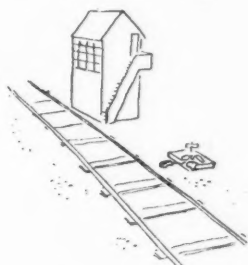
destinies of a community in the country? The solution seems to lie in sending out reliefs of regularly employed Post Office workers from the towns. That way the city worker would get a breath of fresh air, too. In the towns, sub-Post Offices, with their large turnover, have perhaps become an anachronism. They might be absorbed into the Crown Post Office system and the present incumbents given the job of running them, together with a holiday like other workers.—"Poly-critic" in "The New Statesman."

CARRIAGE SEATS AND SAVING PAPER

Cloth from old railway carriage seats and wagon sheets are being used by the G.W.R. in its drive to save paper. Stiffened with plywood, they have been made into wallets, in which part of the company's internal daily mail of 250,000 letters is now carried unenveloped between Headquarters, Divisional Offices, and the bigger stations; as a result thousands of envelopes are saved daily.

Forms and headed paper have been cut down in size, paper and railway tickets made thinner, and used and obsolete forms given a second lease of life as envelopes, memo. pads, or printed again on the plain side as headed paper.

The third G.W.R. salvage drive in four years has unearthed a total of over 2,000 tons of waste paper.



[Reproduced by permission of the proprietors of "Punch"]

A Nation in Chains

It is nearly three weeks since we drew attention to the implications of today, October 1. From this date, we said, Britain would become a concentration camp...

We did not say that Britain would become a Belsen or a Buchenwald. That would have been ridiculous. There are no good concentration camps, but some are better than others.

What we said—and we stick to it—is that the freedom of the British people would be curtailed to an extent never before imagined in times of peace.

A concentration camp has four main objects:

1. To keep the inmates in one place;
2. To restrict their movements within that place;
3. To limit their communications with the outside world;
4. To make them work under orders.

Britain from today, or from next Monday, will satisfy all four conditions. Let us examine them.

1. The people will not be allowed to travel abroad for pleasure, even to "soft currency" countries. They will be effectively confined within the limits of this island.

2. They will not be permitted to go where they like in their own cars or on their own motor-cycles. They will be immobilised—and, to make travel even more difficult, railway fares are to be increased from today.

People may buy petrol only if they can prove it essential. If they diverge from their route they stand in peril of punishment.

Since *The Daily Mail*, three weeks ago, first raised its voice against the petrol ban there has been a rising chorus of protest from all parts of the country. Even Left Wing journals, ardent supporters of the Government, have joined in. Some of them seem to like the concentration camp idea as little as we do.

3. Letters coming in or going out of the country will be opened or X-rayed by "enforcement officers" on the track of illicit currency. Thus the integrity of the mails is to be violated.

The public have been given the soothing assurance that correspondence will not be read. But once a letter is opened it can be perused, and the writer's opinions can be spied upon. From economic to political censorship is a fatally easy step.

4. From next Monday the Control of Engagement Order comes into force. Those outside the exempted categories will have to toe the line or be liable to punishment. A man's freedom to choose his own job has been filched from him.

This is the brave new Britain of 1947. This is the liberty we fought two world wars to cherish. This is Freedom as interpreted by a so-called "people's Government" who believe in social democracy.

We are continually told that full controls are necessary if Britain is to survive. That has been the Government's policy since 1945, but where has it brought us? The more restrictions they impose the worse our situation becomes.

This is not the way to recovery. A nation in chains is a nation without initiative. A man cannot give of his best if he has to live under the eye of the police.

The only forms of enterprise that flourish in such conditions are under-the-counter movements, Black Market dealings and evasions of the law.

These also are all too typical of the concentration camp.—From "The Daily Mail" of October 1.

OVERSEAS RAILWAY AFFAIRS

(From our correspondents)

INDIA

Cuts in N.W.R. Services

In the second week of September the N.W.R. had to suspend more train services due to shortage of coal. As the railway capacity between the coalfields and the N.W.R. was limited seriously by the disturbances, the Indian Railway Board and Pakistan railway officials agreed to an arrangement by which the N.W.R. was to be fed by the sea route. The first ship, carrying 6,000 tons of coal for Pakistan railways, arrived in Karachi on September 10.

The running of trains on the Delhi—Kurukshetra section of the Eastern Punjab Railway was suspended from September 5 owing to lack of sufficient military escorts. The "Kalka—Calcutta Mail" ran from Kalka as far as Ambala Cantonment, and the "Calcutta—Kalka Mail" terminated at Delhi. Passengers had to travel between Delhi and Ambala Cantonment by the Bombay—Peshawar "Frontier Mail."

Restricted Inter-Dominion Services

There was no improvement in communications between India and Pakistan until the third week of September. The "Frontier Mail" was the only scheduled train running between Delhi and Pakistan, the rest of the railway capacity being concentrated on the exchange of evacuees. The North Western and the Eastern Punjab Railways were carrying about 50,000 refugees by ten special trains between West and East Punjab daily.

Shortage of Crews in Punjab

The Ministry of Railways has asked for volunteers to serve as drivers, firemen, and guards on the Eastern Punjab Railway, which is in urgent need of running staff to enable it to deal adequately with the refugee traffic. The Railway Board recently requested general managers of other Indian railways to call for volunteers among their staff, but the response was not encouraging. Substantial additions to pay have been offered by the Eastern Punjab railway to those willing to serve in what is described as a "national emergency."

New Railways Ordinance

An Ordinance called the "Railways (Protection by Armed Forces) Ordinance, 1947," has been issued to provide increased punishment for dereliction of duty by members of the armed forces. By this Ordinance, if any military or Air Force personnel placed on duty to protect from acts of violence any passenger or goods being conveyed by railway fails in the proper performance of that duty, he will be liable to be punished with rigorous imprisonment for a term extending to 10 years; or with death if on the occasion of his offence any loss of human life occurs.

Chief Commissioner's Appeal

Mr. K. C. Bakhle, Chief Commissioner of Railways, broadcast a message on "The Task before Railwaymen" on September 19 from the Delhi station of All-India Radio. Mr. Bakhle drew railwaymen's attention to the fact that in spite of the excellent record which railways held for operation and output during the war, there had since then been a gradual but a definite falling off in the standard of ser-

vice, in the maintenance of assets and in output. Much of this, he observed, was avoidable and the cause was not war-weariness only.

Mr. Bakhle also referred to the problems of refugee evacuation and transport of urgent necessities, such as coal, food, and cloth. In the face of the enormous difficulties which arose as the result of the partition of India and the civil disturbances which followed, the railways, said Mr. Bakhle, had transported in the disturbed areas from August 15 to September 18 a total of about 700,000 refugees of all communities, including the trans-frontier moves, and dispersal from camps within India.

CEYLON

Trial Run of New Railcars

Mr. J. L. Kotelawala, Minister of Communications & Works, took part on August 4 in a trial run from the Fort (Colombo) to Alutgama of two of the five new English Electric diesel railcars which arrived in the island recently (see *The Railway Gazette* of July 25). The two cars, coupled together, made the run of 37 miles, with a stop at Ratmalana, in just over an hour, and attained a speed of 50 m.p.h. on some sections. The Minister announced that it was proposed to use the new cars on a one-class luxury service between Colombo, Galle, and Kandy, covering the 72 miles in 2 hr. or less and charging a little more than the normal second class fare.

Mr. H. W. Freer, Chief Mechanical Engineer, Ceylon Government Railway, said that the balance of the diesel railcars, making a total of 23, was expected to be in service before the end of this year. The railway had on order eight trains similar to the three which had been in use for some time, but with six coaches instead of four.

Floods and Washaways

Ceylon experienced recently the worst floods in living memory. The three main rivers in the island, the Mahaweli, the Kelani, and the Kalu Ganga, overflowed their banks, submerging vast areas and causing great devastation of property and the loss of hundreds of lives. The peak was reached in the early hours of August 17. Colombo was cut off from most parts of the island, the only lines clear for rail traffic being the coast line and the narrow-gauge Kelani Valley line to Ratnapura.

The Kandy area was affected more seriously than Colombo, by very heavy rain and the sudden overflow of the Mahaweli Ganga. Two suburbs adjacent to the river, Peradeniya and Getambe, were devastated, and thousands rendered homeless, while many lives were lost. The 75-yd. steel railway bridge spanning the river, and linking Peradeniya with Kandy, was washed away completely. The loss of this bridge is one of the major disasters which the railway has to face, as its replacement will take months of hard work.

Severe landslides, earth slips, and washaways of the line were experienced at many points, especially in the up country section. Postal services also were interrupted. Food had to be distributed to the worst-affected areas by air, and thousands of flood victims were accommodated temporarily in railway wagons, churches, schools and other buildings. A flood relief

scheme was inaugurated immediately by the Governor and received a wide and quick response. This was besides the State-aided schemes for feeding and rehousing the victims.

WESTERN AUSTRALIA

Results to June 30, 1947

A comparative statement of working the Western Australian Government Railways, issued by the Commissioner of Railways (Mr. J. A. Ellis) in advance of his annual report, shows a deficit on the year 1946-47, after payment of working expenses and interest, of £1,410,856, compared with a deficit of £959,804 for the previous financial year. Earnings for the year were £4,045,935, a drop of £60,783, while working expenses were £4,423,801, a rise of £397,095. It will be seen that earnings failed to meet working expenses by £377,866, while interest charges on capital amounted to £1,032,990. The percentage of working expenses to earnings was 109.34 per cent., compared with 98.05 per cent. for 1945-46.

The deterioration in the financial position can be attributed to the steep rise in costs over which the department has no control, such as improvements in pay and conditions granted to staff by industrial tribunals, and rises in the price of practically all commodities used by the department; also, increases in staff with the return of men from the Forces, and the carrying out of a greater amount of maintenance work than was possible during the war and immediately thereafter. On the other hand, charges have remained static since pre-war days, and while rail users have had the benefit of this policy on the part of the State Government, the difference between costs and receipts has been made a charge on the general community.

Train-Mileage Higher

Train-miles totalled 6,727,963, an increase of 318,685. In consequence of this increase, earnings per train-mile dropped from 153.78d. to 144.33d., while working expenses per train-mile rose from 150.78d. to 157.81d. A contributing factor to the rise in train-mileage was the discontinuance for a period of the use of the powerful Australian Standard Garratt locomotives, owing to the disinclination of the locomotive engineers to work these units, which ultimately culminated in the strike of November, 1946 (see *The Railway Gazette* of November 29 and December 27, 1946).

Passenger train journeys dropped from 17,136,230, a reduction of 3,494,436. The strike of engineers in November, during which the railways were idle for 16 days, affected passenger journeys to a considerable extent, while easement of petrol restrictions brought greater use of private vehicles. Cessation of troop movements after the end of hostilities also was a big factor in the reduction of passenger journeys.

Goods and livestock earnings showed an increase. The actual tonnage handled was less than in the preceding year, but the average haul rose, with consequent increase in ton-mileage. Also, there were reductions in the volume of some of the lower-rated traffics, such as wheat, firewood, and fertilisers; and increases in the tonnage of the higher classes. The average haul for all goods traffic was 141.94 miles, an increase of 12.95 miles; and the average earnings per ton-mile were 1.79d., compared with 1.76d. in 1945-46.

The mileage of line open at June 30, 1947, was 4,348, a reduction of 33 miles, due to the removal of a section of railway isolated from the main system, which had

not been worked for many years, but which had remained as a portion of the mileage of opened railway until Parliament authorised its pulling up. The population of the State at June 30, 1947, was 503,000, representing 113 persons to every mile of railway, which is understood to be the lowest population per mile of railway of any country in the world. The average staff employed during the year was 9,294, an increase of 696.

ARGENTINA

New Rolling Stock for State Railways

Under the five-year plan of the Argentine Government, a sum of ps. 800 million has been set apart with which to modernise and re-equip the State Railways. A beginning has been made already with a very extensive programme, and North American firms are at present building 75 locomotives and 1,000 goods wagons.

Of the former, 15 are of the Pacific type, and are under construction at the Lima Locomotive Works, while the remainder are of the Mountain type; 30 of the latter have been ordered from the American Locomotive Works, and 30 from the Baldwin Locomotive Works. Delivery is expected early in 1948. The goods wagons are being built by the Pullman Standard Company and the American Car & Foundry Company, and are expected to be completed by the end of the present year, or the beginning of 1948.

Tenders have been called for the provision of 320 passenger coaches and 15 Santa Fe type locomotives; and on November 14 additional tenders will be called for a further 2,450 goods wagons of the following types: 735 35-ton box

wagons; 250 fruit wagons; 400 flat wagons of different types; 15 wagons for the transport of poultry; 250 petroleum tank wagons; 50 naphtha tank wagons; 100 water tank wagons; and 650 gondola wagons, 300 with reversible sides.

UNITED STATES

Electric Locomotive Washing Plant

The Pennsylvania Railroad has installed a semi-automatic washing machine to deal with electric locomotives in the yard at Sunnyside, New York. Locomotives move on to the washer under their own power, taking current from the rear pantograph. They are then propelled through the machine, which is about 300 ft. long, by means of an electric trolley running in a pit. At the end of the process the locomotive is pushed forward by the trolley until it can again pick up current from the front pantograph.

The washing solution and water for rinsing are applied by sprays, and as the locomotive passes through the washer, its sides are scrubbed by motor-driven rotating brushes. This installation is designed to wash 100 locomotives in 24 hr., each operation requiring 15 min. as compared with 55 min. for doing the work by hand.

N.Y.C. Kitchen and Dining Car

Early in September the New York Central placed a new dining car and kitchen-lounge car in service between New York and Chicago. These vehicles were built by the Budd Company, and three similar two-car sets will be placed in operation shortly. The dining car seats 24 passengers at tables, and provides, also, six seats in the end section where passengers

can wait until tables become vacant. This vehicle is coupled next to the kitchen-lounge car, and the communicating door is approach-operated by means of a photo-electric cell.

One section of the kitchen-lounge car contains the 41-ft. kitchen, equipped with complete electro-mechanical refrigerating apparatus. The lounge section of the car accommodates 21 passengers in lounge chairs and built-in seats, with tables.

SOUTH AFRICA

New Coaches Due in Union

Within the next few months, 95 new main-line passenger saloons, ordered by the South African Railways in Great Britain, are expected to arrive in the Union. The saloons will be painted in the new and distinctive colour scheme which has been adopted by the railways—deep crimson, with a broad cream-coloured band the depth of the windows, and two narrow cream-coloured bands beneath the windows. The roofs will be painted with aluminium paint, not only for the sake of appearance, but to reduce the heat inside the coaches during long summer journeys.

This colour scheme will be introduced gradually on all main-line trains, but, owing to the shortage of rolling stock, coaches will be repainted only when they go into the workshops for routine overhaul. Uniformity therefore is not likely to be achieved for a considerable time. Suburban trains will continue to be painted the present deep brown. During July the railways received 21 new engines of different classes from Britain, and these were put into service at once.

Publications Received

The Light Railways of Britain. By R. W. Kidner. Chislehurst, Kent: The Oakwood Press, 30, White Horse Hill. 7½ in. × 4½ in. 40 pp. Illustrated. Paper covers. Price 2s. 6d.—Both narrow-gauge and light standard-gauge passenger railways are covered in this booklet, which is intended as a survey of inexpensive lines generally; more detailed information on particular lines is available in the Light Railway Handbooks. The author divides the history of light railways into three periods, namely, the Early Days from 1863 to 1896, the Period of Development from 1896 to 1925, and the Period of Decline from 1926 to 1947. In conclusion, there are some notes on present-day locomotive stocks of light railways.

History of Travel and Communication. Book II: Communication. By L. Moakes. Reading, Berks: John Crowther Limited, 3, Cork Street. 9 in. × 5½ in. 68 pp. Illustrated. Price 6s.—This is a companion volume to "Book I: Travel," by the same author, which we reviewed in our issue of March 8, 1946. It deals quite briefly, in 31 sections, with the various means of conveying messages from the earliest forms up to the Atlantic air mail and television. Obviously it is designed as a school introduction to the subject, suitable for junior forms. The illustrations are generous, and the accompanying notes sufficiently explanatory, definite, and accurate, to serve to stimulate interest to an extent that should pave the way for wider reading later. The book is essentially a collection of notes, and the principal defect appears to us to be that these notes do not differentiate between the freak and

widespread practice. For example, there is nothing to tell the reader that the mail rocket and the pigeon post are not such accepted means of communication as the railway travelling post office.

Contribution to Victory.—Radar, the gas turbine, and many other devices developed during the war are passing today into commercial use. The Metropolitan-Vickers Electrical Co. Ltd. has published a handsome illustrated volume setting on record the part it played in the design and manufacture of an extensive range of electronic and electrical apparatus, and other machinery, throughout the war years.

The company was given sole responsibility for the design and construction of transmitters for the C.H. (Chain, Home) radar stations which were in operation at the outbreak of war, and subsequently developed the C.H.L. (Chain, Home, Low Angle) transmitters for detecting low-flying aircraft. An associate, the British Thomson-Houston Co. Ltd., was prominent in developing the magnetron oscillator, which made radar technique practicable on centimetre wavelength, leading to the design of the numerous airborne installations for blind bombing and navigation. It is from this type of apparatus that the present Metrovick marine radar apparatus has been evolved. As an illustrated history of radar alone, the book is a valuable technical record, assembling the mass of information that has become available since the war.

Many operations in aircraft once performed manually or by hydraulic machinery were converted to electricity during the war. Metrovick manufactured both the actuating machinery, and the generating, voltage-regulating, and associated

equipment which made every operational aircraft a power station in miniature. Along with all this work for the R.A.F., went the production of heavier electrical equipment for land and marine use. All these special wartime achievements were carried on, it is emphasised in a foreword by the Chairman, Sir George E. Bailey, concurrently with the normal activities of the company.

Laminated Insulation.—The many uses of Permalin—the laminated material which combines a high strength-weight ratio with excellent insulating properties—are clearly and comprehensively described in the new Data Book, now available from the manufacturers, the New Insulation Co. Ltd., Gloucester. Of special interest to railway engineers is Section G, which deals with track insulation.

Creep Resisting Steel.—Valuable experience has been gained in recent years in the application of steels to high temperature service, and recognition of the basic principles underlying the choice of materials has narrowed down the selection for the lower temperature ranges to a few types of simple composition. Four of these steels, which are intended for work at temperatures to 1,000° F., form the subject of an interesting brochure issued by Samuel Fox & Co. Ltd., Sheffield, a branch of the United Steel Companies Limited. Results of maximum stress and proof stress tests at high temperatures are given to show the effect of temperature on properties normally determined at room temperature, and the scaling index quoted for each steel gives a fair indication of the performances to be expected in conditions comparable to those of the tests on which the index is based.

Eight-Coupled Tank Engines for West Africa

A powerful type for heavy shunting and freight transfer service

THE 15 eight-coupled tank engines recently delivered to the Nigerian Railway and the Gold Coast Government Railway by the Hunslet Engine Co. Ltd. form a good example of a powerful shunting and freight transfer engine for 3-ft. 6-in. gauge lines where axle loads are restricted. They have a T.E. of 23,500 lb. at 75 per cent. (28,240 lb. at 90 per cent.) of the boiler pressure, and an adhesion factor of 4.6 (3.83).

The locomotives of the 0-8-0T wheel arrangement have 3-ft. 6½-in. wheels spread over a base of 13 ft. 3½ in., but the total frame length is more than twice that distance, being 27 ft. 7½ in. Over centre couplers the length is 31 ft. 10½ in. for Nigeria and 31 ft. 2½ in. for the Gold Coast. The height to the top of the chimney is 12 ft. 4 in., and the width over footsteps 8 ft., but owing to the unusual shape of the loading gauge in West Africa, the cab can be swelled out to a maximum width of 9 ft. 6 in. A remarkably even distribution of weight is obtained in the full working order condition, the respective axle loads being, from the front, 12 tons 4 cwt. + 12 tons 5 cwt. + 12 tons 1½ cwt. + 12 tons 1½ cwt.; total 48 tons 12 cwt. This is with the full loads of 1,000 gal. of water and 2 tons of coal.

With tanks and bunker empty the locomotive weight is 38 tons 16½ cwt.

A two-ringed boiler of 4-ft. 3-in. dia. is pitched 7 ft. 3 in. above rail level, and has a Belpaire firebox, and an inner box of copper, the inside length of which is 5 ft. 11½ in. The barrel, 9 ft. 7 in. in length, contains 174 steel tubes 1½ in. o.d. and 9 ft. 11½ in. between tube plates. These give 791 sq. ft. of heating surface, and the firebox contributes a further 93 sq. ft. to the total of 884 sq. ft. The grate has an area of 13.35 sq. ft., and beneath it the ashpan has a sliding bottom door for emptying. Water conditions in Africa have resulted in the practice of giving the inside of the boiler shell a coating of cement before the inner firebox and tubes are put in. Above the firebox are two 2½-in. Ross pop safety valves.

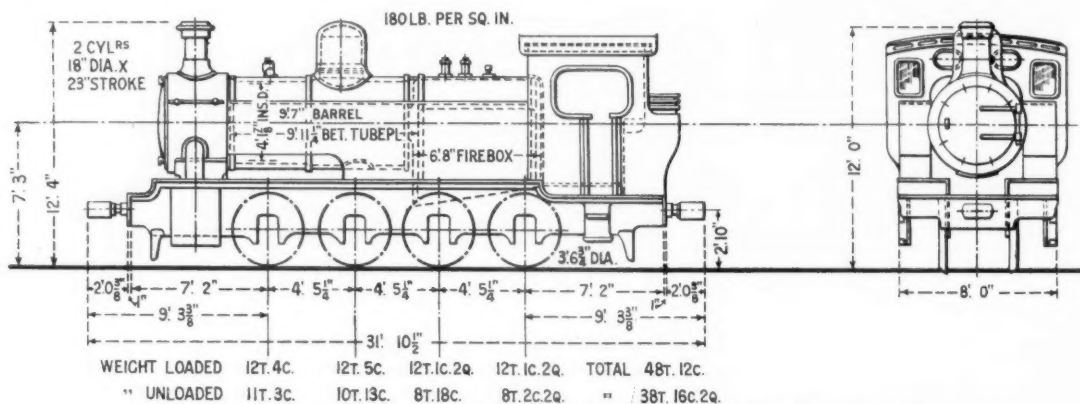
The two outside cylinders, 18 in. dia. by 23 in. stroke, drive the third pair of wheels through connecting rods 8 ft. 7 in. long. Piston valves of 8 in. dia. are used, and are actuated by Walschaerts gear adjusted by lever reverse. All wheels are flanged, but the intermediate and driving pairs have thin flanges so that the locomotive can traverse easily 280-ft. curves without any gauge widening, and go over 1 in 6½ points and crossings.

Axleboxes are of solid phosphor bronze with whitmetal inserts, and are lubricated from a Wakefield mechanical lubricator. A renewable steel liner is fitted on one side of each hornblock, but there are no wedges. The boxes are supported by underhung laminated springs compensated in two groups. Other fittings include steam and hand brakes for the locomotives, vacuum equipment for the train brakes, Lambert wet sanding gear, a British Detroit sight-feed lubricator for the cylinders and steamchests, and a wire net spark arrester in the smokebox.

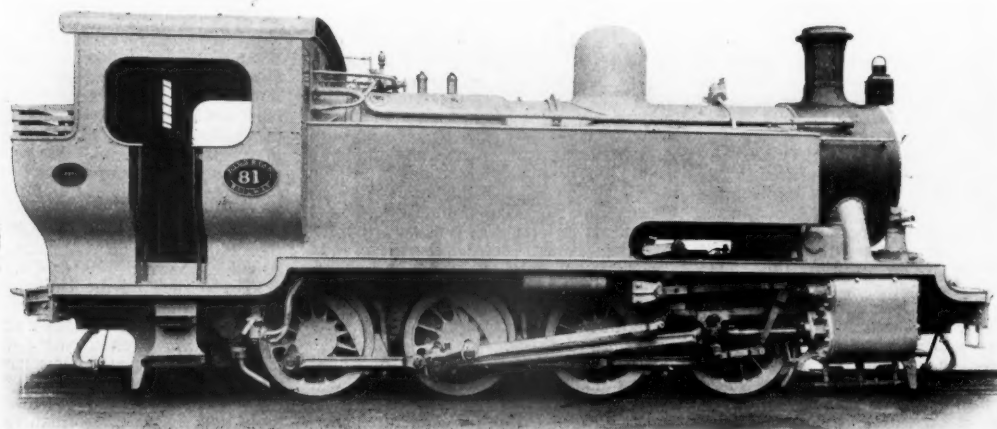
The principal dimensions are:—

Gauge	...	3 ft. 6 in.
Cylinders (2), dia. x stroke	...	18 in. x 23 in.
Coupled wheels, dia.	...	3 ft. 6½ in.
Wheelbase (rigid, total)	...	13 ft. 3½ in.
Adhesive weight (= total weight)	...	48 t. 12 cwt.
Boiler pressure	...	180 lb. per sq. in.
Heating surface:		
Tubes—174, 1½ in. outside dia.	...	791 sq. ft.
Firebox	...	93 sq. ft.
Total	...	884 sq. ft.
Grate area	...	13.35 sq. ft.
Tractive effort at 90 per cent. b.p.	...	28,240 lb.
Adhesion factor at 90 per cent. b.p.	...	3.83
Tractive effort at 75 per cent. b.p.	...	23,500 lb.
Adhesion factor at 75 per cent. b.p.	...	4.6
Coal capacity	...	2 tons
Water capacity	...	1,000 gal.

Further orders totalling 16 of these locomotives are in hand, and, as with the 15 just described, are to the requirements of the Crown Agents for the Colonies.



Principal dimensions and weights of 0-8-0 tank locomotive for 3 ft. 6 in. gauge railway



One of 15 Hunslet 0-8-0 tank engines exported to West Africa

German Portable Diesel Pile-Drivers

Two light and handy types developed during the war

THE present acute shortage of coal compels attention to alternative fuels for as many purposes as possible; one of these is pile-driving by diesel power. For rapid carriage, erection, and operation, during the war, the Germans produced two diesel pile-drivers, known as the "SZ" and

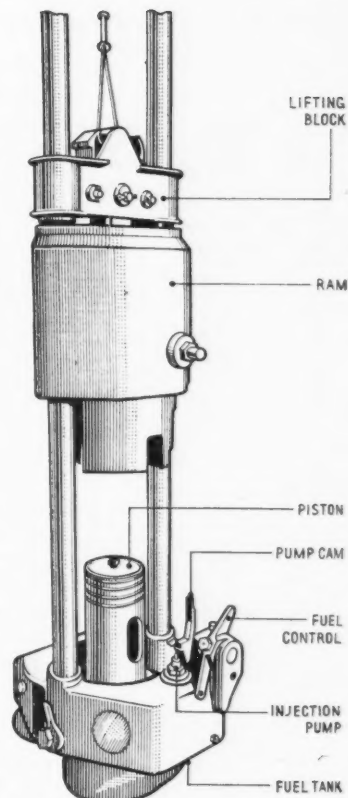
few details of the smaller "SZ" and of the three sizes of "DB" are tabulated below. The larger size of "SZ" has a 24-cwt. ram.

Before the start of driving, the ram in both types is lifted by winch and tackle. Then, in falling freely, it simultaneously: (a) compresses air in a closed cylinder, (b) actuates a cam, which causes fuel oil to be injected into the highly-compressed air in the cylinder, and (c) closes the fuel inlet from the tank. The resulting ignition and explosion forces the ram up again through a height depending on the intensity of the explosion, which intensity is governed by the quantity of fuel admitted; a control valve regulates this quantity, and is operated by a chain.

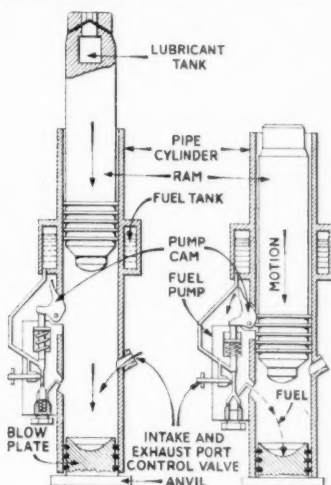
The principal difference between the two types of hammer assembly is that the "SZ" has an enclosed piston type of ram working up and down in a steel tube, as shown by the accompanying drawings. The "DB," on the other hand, has a guided ram falling in the open, on to a piston to compress air in a cylinder, in the anvil part of the assembly.

The special rig for use with the smaller "SZ" hammer weighs little more than a ton, and is designed for the manual erection and handling of both pile-driver and pile; the heaviest part of it is a double-drum winch which weighs under 4½ cwt. Its base frame is triangular and collapsible, and on it the winch is fitted at the opposite side from the hammer so as to serve as part of the counter-weight; it is mounted on small wheels for local manoeuvring. The hammer guide or boom, and also the two stiff-legs completing this tripod rig, are triangular in cross-section and fabricated with tubular members.

For the 36-cwt. "DB" hammer, the rig is mounted on a turntable revolving on a base frame fitted with double-flanged wheels running on rails. A 24-kW.



The "DB" type hammer with ram moving between guides



Cross-section of "SZ" hammer assembly

"DB" (diesel-bar) types. Both are single-acting and use a diesel explosion to lift the hammer before its free fall under gravity for driving. Each type has a special rig designed for easy portability and erection, though the designs differ considerably. The "SZ" is made in two sizes and the "DB" in three; a

generator supplies power to a motor driving the hoist and rig. A box-section hammer guide, 65 ft. in length, is hinged to the top of a triangular section boom, permitting of pile-driving with a batter in any direction. Rig and hammer together weigh 15 tons, according to our American contemporary *Engineering News-Record*, to whom also we are indebted for the illustrations reproduced.

	Smaller "SZ"	Small "DB"	Medium "DB"	Large "DB"
Weight of hammer or ram in cwt. ...	10	12	24	36
Max. height of fall of ram ...	6 ft. 6 in.	4 ft. 6 in.	4 ft. 6 in.	4 ft. 6 in.
Consumption per working hour : Diesel fuel ...	0.8 gal.	1.6 gal.	2.2 gal.	2.6 gal.
Lubricating oil ...	1 pint	2 pints	2 pints	2 pints
Total weight of hammer assembly ...	18 cwt.	49 cwt.	69 cwt.	89 cwt.



Left: "DB" hammer driving a 45 ft. x 16 in. dia. pile. Centre: "DB" in position for driving with batter. Right: "SZ" driver holding hammer with one winch drum while lifting pile with the other

Air-Driven Alternator for G.W.R. Locomotive Lighting

Steam ejector provides air flow for generating current to light head, tail, and cab lamps

AN experimental lighting set, manufactured by the Metropolitan-Vickers Electrical Co. Ltd., to a design quite new in the field of locomotive lighting, has been fitted recently for trial, to G.W.R. 4-6-0 oil-fired engine No. 3904, *St. Bride's Hall*. Current for engine head and tail lamps, cab lighting, and inspection lamps is supplied by an alternator of rugged, simple construction, using a permanent magnet for excitation, the only winding being mounted on the stator.

The alternator is driven by an air turbine mounted in the same casing, the power unit so formed being carried on a bracket fixed to the right-hand side of the smokebox. The air is drawn through the turbine and exhausted into the smokebox by a single-orifice steam ejector mounted vertically at the side of the power unit, the pressure drop across the turbine being very low, and the volume of air flowing comparatively large.

The electrical and mechanical characteristics of the set are such that a fairly constant E.M.F. of about 12 V. is obtained over a wide range of load and boiler steam pressure, this voltage being applied to pairs of 6-V. 6-W. lamps in series as described later; or, for circuits requiring only one light, to a 6-V. 6-W. lamp and series resistance of 6 ohms. By virtue of this arrangement, only one type of lamp has to be stocked for all purposes.

The advantages of the air turbine are that a small set can be designed with a low steam consumption; the bearings run cool, as steam does not pass through the machine; and the set can be operated without the use of a governor. The turbine is put into operation by means of a valve mounted on the steam fountain, and the lights are selected by means of a control panel on the fireman's side of the cab.

This panel consists of a set of five switches, with repeater lights, which con-

trol the head and tail lamps; a switch for selecting the circuits appropriate to "engine leading" or "tender leading"; and two switches controlling the cab floodlight and oil fuel control quadrant light respectively. Whenever the set is in operation, an illuminated panel indicates either "engine leading" or "tender leading," and the circuits are arranged so that white code marker lights only can be switched on at the end indicated as leading, and a red tail light only at the other end.

The repeater lights on the control panel are wired in series with the appropriate marker lights, thus giving visual indication in the cab of the chosen code, and at the same time providing for a tell-tale indication of the failure of any of the circuits involved. Provision is made for an inspection lamp which can be plugged into points situated one on each side of the locomotive, and one in the cab.

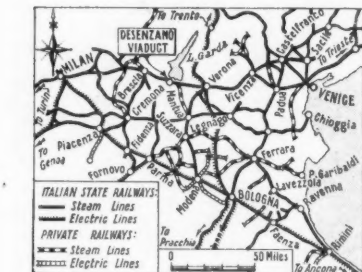
For identification purposes in daylight, white code marker discs 9 in. in dia. are carried on the engine, each disc being provided with two prongs which can be slipped into corresponding sockets mounted one on each side of each marker light housing. (See illustrations, pages 410-411.)

Reconstructed Viaduct at Desenzano, Italian State Railways

A description of the original Austrian-built and the new reinforced-concrete structures

BEFORE 1859, when Lombardy was still a part of the Austrian Empire, the railway from Milan to Venice was constructed by the Austrian railway administration. At Desenzano, 69 miles east of Milan, this railway—now the main Milan-Venice line of the Italian State Railways—was carried across a depression close to the southern tip of Lake Garda on a remark-

able double-line masonry viaduct. It was over 1,000 ft. long and, as one of the illustrations on page 409 shows, it consisted of extremely massive pointed arches, 17 in number and each having a 17-m. (55-ft. 9-in.) span.



Location of viaduct on Milan-Venice main line

able double-line masonry viaduct. It was over 1,000 ft. long and, as one of the illustrations on page 409 shows, it consisted of extremely massive pointed arches, 17 in number and each having a 17-m. (55-ft. 9-in.) span.

Despite its apparent strength, this structure—which is now nearly 100 years old—had begun to show signs of failure before the war, and had been reinforced with steel tie rods where cracks had appeared; all traffic over it was also subject to speed restriction.

Then, during hostilities, a considerable portion of the viaduct was demolished, so that the whole structure recently has had to be rebuilt.

As the foundations of the piers of the original bridge were sound and capable of carrying a light modern superstructure up

to the heaviest present-day loading standards, it was decided to rebuild the demolished piers on the old foundations, and to strengthen the others up to the level of the springing of the old arches. To reduce its deadweight to a minimum, the new superstructure was designed, in reinforced concrete, with separate spans having their vertical supports poured as integral parts of rectangular two-hinged arches resting on the piers.

As one of the illustrations shows, the vertical members are of cellular or multiple-column design, and the lightweight construction as a whole has reduced the dead load on the piers by nearly 42 per cent. as compared with their loading under the old masonry superstructure.

The length of line over the viaduct, and seven other short lengths of the Milan-Venice main line, still are being worked as single-line sections, in most cases because bridges have had to be rebuilt temporarily for single line only.

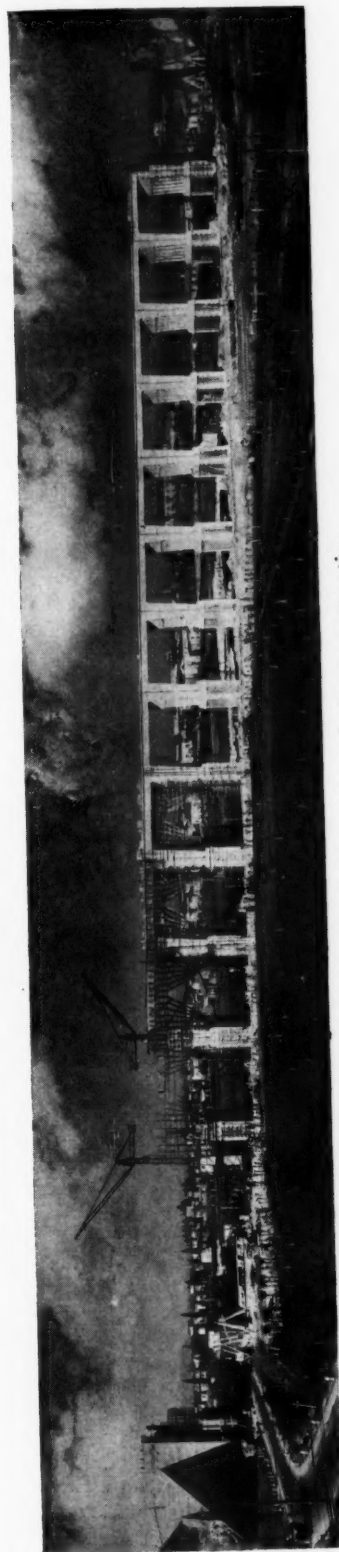
THE "MASTER CUTLER" EXPRESS. L.N.E.R.—To mark the naming of the "Master Cutler" express between Sheffield and Marylebone on October 6, the L.N.E.R. has issued a timetable folder in which are given some details of the history of the ancient Cutlers' Company. The company, which is known in full as the "Master, Wardens, Searchers, Assistants and Commonalty of the Company of Cutlers in Hallamshire in the County of York," was incorporated by an Act of 1624. This body has stood always for the production and development of all that is best in the highly specialised cutlery, steel, and edged tool industries. It still maintains its authority in the use and registration of trade marks, and the safeguarding of the name of Sheffield. The introduction of the "Master Cutler" train by the L.N.E.R. gives expression to the close link between the railway and the city of Sheffield, and

symbolises the tradition of strength and excellence upheld by the Cutlers' Company. A map of L.N.E.R. lines between London and Yorkshire appears on the back of the folder, with the route of the "Master Cutler" picked out in gold. Leaving Sheffield Victoria at 7.40 a.m., the up train reaches Marylebone at 11.15 a.m., calling at Nottingham, Leicester, and Rugby. The return service is at 6.15 p.m. from Marylebone, arriving in Sheffield at 10.2 p.m. Restaurant car and seat reservation facilities are available in both directions.

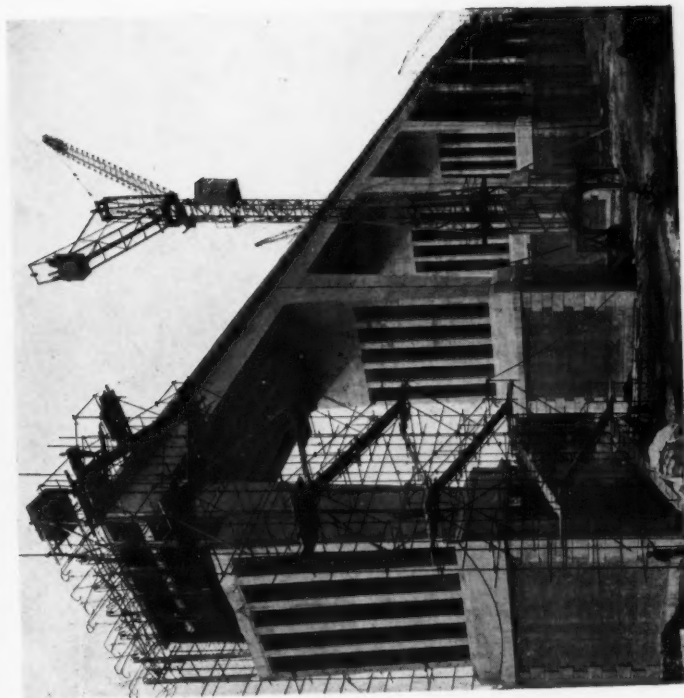
L.N.E.R. YORKSHIRE CENTENARIES IN OCTOBER.—The hundredth anniversaries of opening two lines in Yorkshire occur this month. The first centenary was reached on October 4, when the running of the first train between York (Bootham Junction) and Market Weighton, a distance of 21½ miles, on the then York & North Midland Railway, was celebrated. The new line connected at Market Weighton with the line of the Hull & Selby Railway, which long before had been acquired by George Hudson, and so brought into the York & North Midland company's orbit. The second centenary on October 20 is that of the Filey to Bridlington section, 13½ miles, of the Hull and Scarborough line, itself also a section of the York & North Midland.

STOVING PAINT FOR PROTECTION OF IRON AND STEEL.—The British Standards Institution has published a provisional British Standard (B.S. 1391) for a performance test for protective schemes embracing stoving paints used for the protection of light-gauge steel and wrought iron against corrosion. The specification has deliberately been made provisional, and its issue is intended to lead to the accumulation of experience as to its applicability. It is proposed to issue a questionnaire within twelve months requesting those who have had occasion to use the test to give information concerning their experience; the B.S.I. requests users who may feel able to collaborate in this way to communicate with the Institution. Copies may be obtained from the B.S.I. Sales Department, 24, Victoria Street, London, S.W.1, price 2s. 6d. post free.

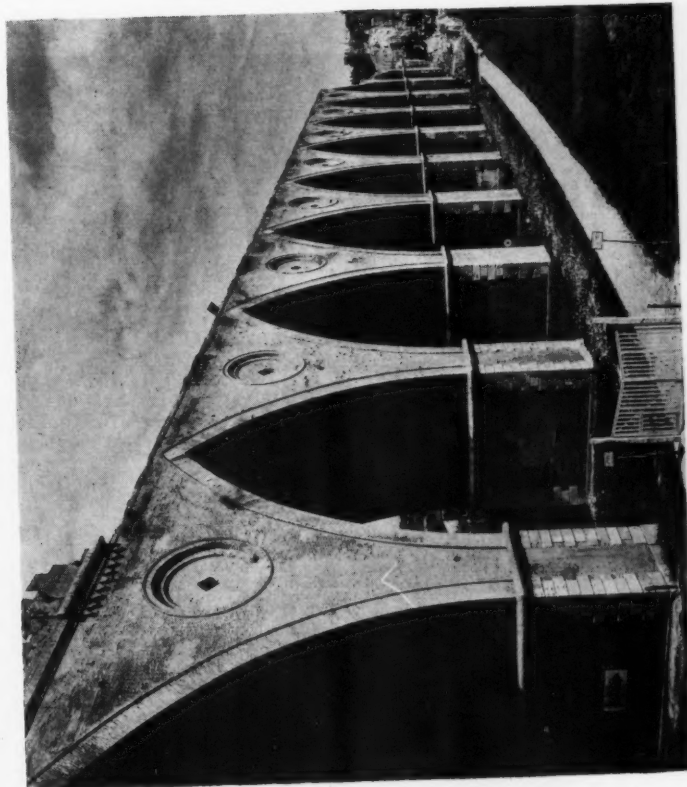
Reconstructed Viaduct at Desenzano, Italian State Railways



General view of the viaduct during reconstruction



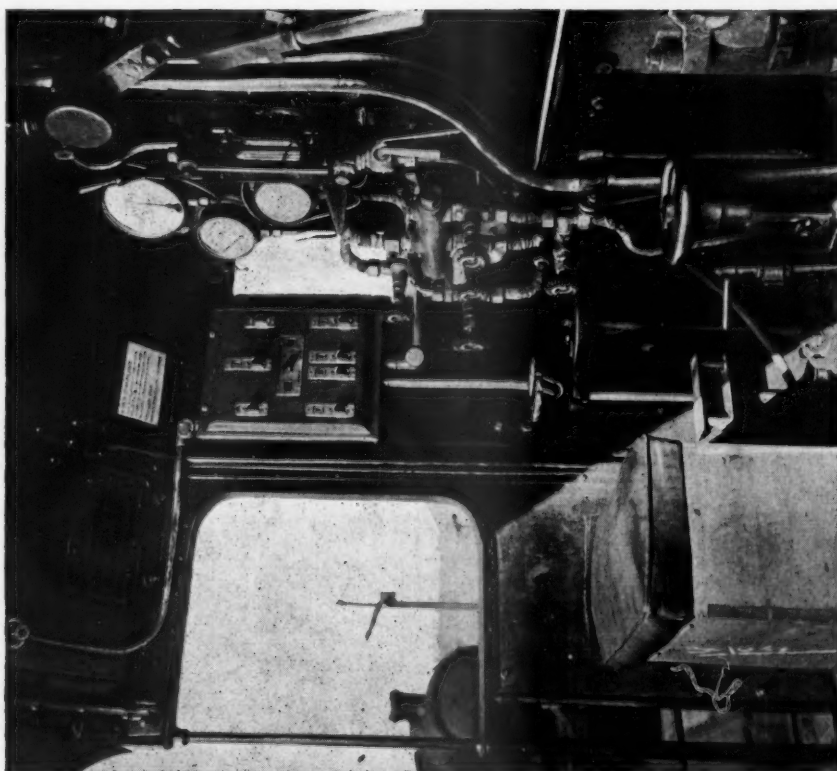
New ferro-concrete superstructure resting on existing piers



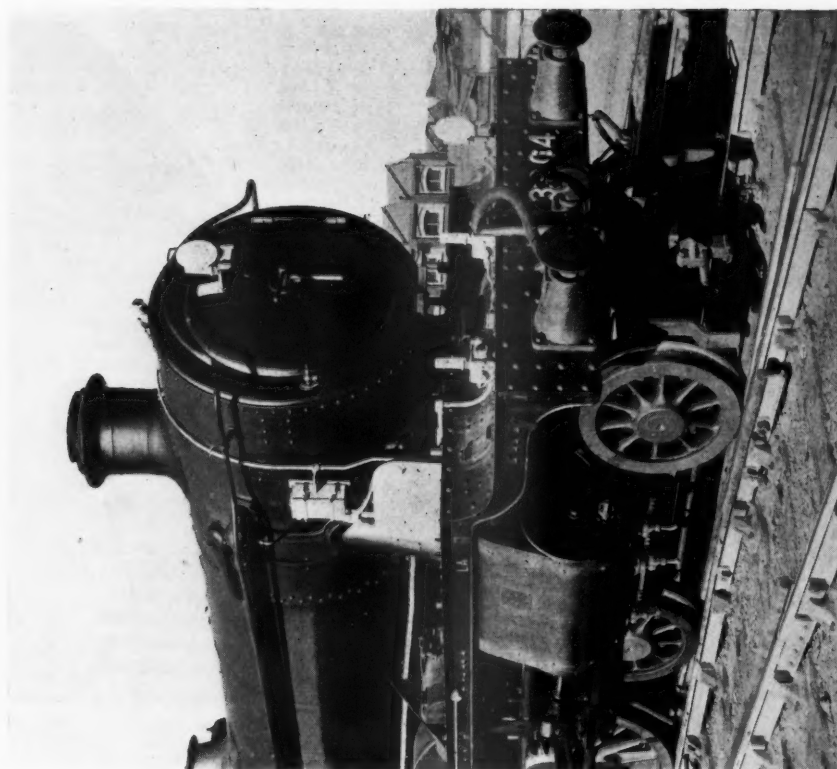
The original masonry viaduct, with one end demolished

Air-Driven Generator for G.W.R. Locomotive Lighting

(See article on page 408)



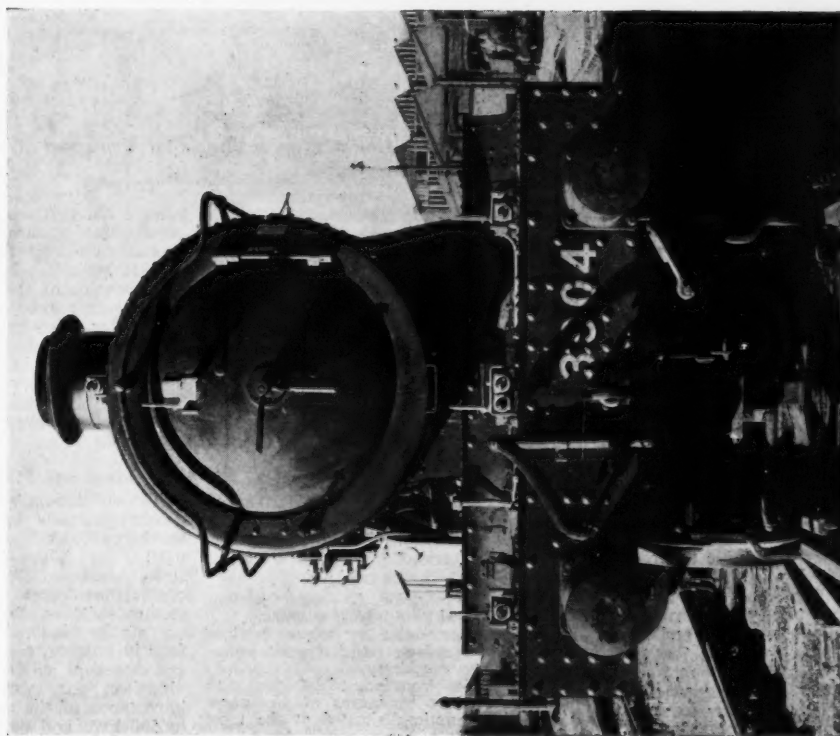
Control panel in cab, with switches for head and tail lights, cab lights, and "engine leading" or "tender leading" selection. Every switch has a repeater light



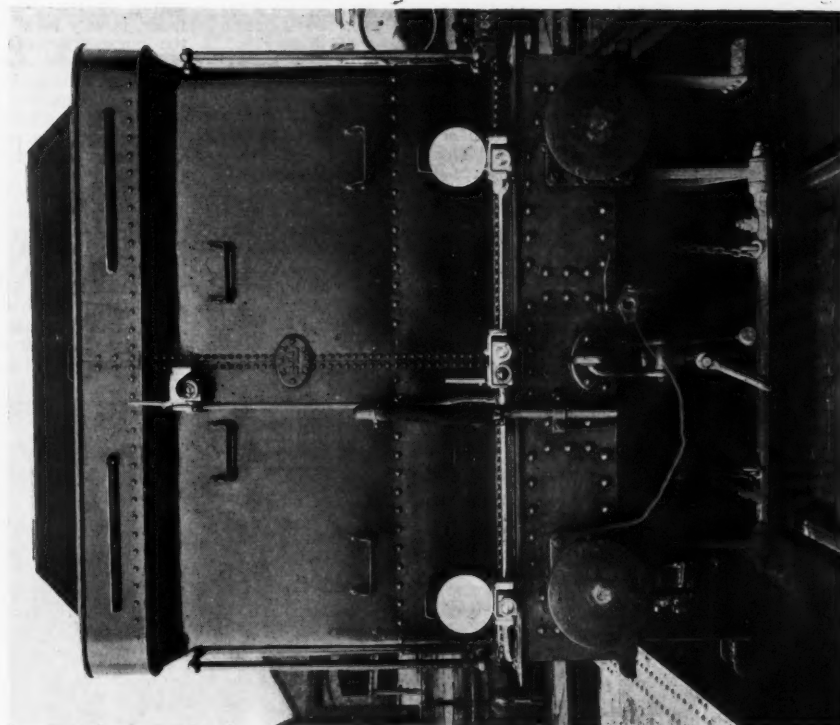
Smokebox of "St. Bride's Hall," showing the casing containing the turbine and generator, and the connections to the ejector which provides the pressure-drop for driving the turbine

Air-Driven Generator for G.W.R. Locomotive Lighting

(See article on page 408)



Front-end of locomotive, showing the electric headlights and the supports for carrying white marker discs in daylight



View of the tender lamps, showing also two of the daytime marker discs in position

Electrification of the Italian State Railways*—1

Choice of supply systems; characteristics of a.c. and d.c.

By Lt.-Colonel A. C. Ping

THE question of railway electrification in Italy was raised in 1897, when a committee was appointed by the Government to examine the possibility of adopting electric traction on the railways. At that time it had become necessary to compete with the suburban tramways in the neighbourhood of some of the largest towns, and also to reduce the cost of operation on lines with only a small amount of traffic.

Nevertheless, the committee took into consideration also the case of lines with heavy traffic, and therefore proposed that four experiments should be tried: two with railcars equipped with accumulator bat-

teries, and two with 650-V. d.c. 3rd rail; and one with 3-phase a.c. at 3,000 V., 15 cycles. It was proposed to test this high-voltage system on a line where the traffic was considerable. It was the first time a contact line had been fed at such a high voltage; the choice of the low frequency was made in order to avoid the installation of reduction gearing between the electric motors and the axles of the locomotives, and this at the same time reduced the rail losses.

The 3-phase system has been almost exclusive to Italy, and indeed frequently has been called "The Italian system"; the reason for this is that Italy was the first nation to consider the application of electric traction to railway lines with very heavy traffic, and at the time the only electric motor which was able to produce the power required was the 3-phase induction motor. The result of the experiments with accumulators, performed on short suburban lines, was bad, and therefore this system was given up.

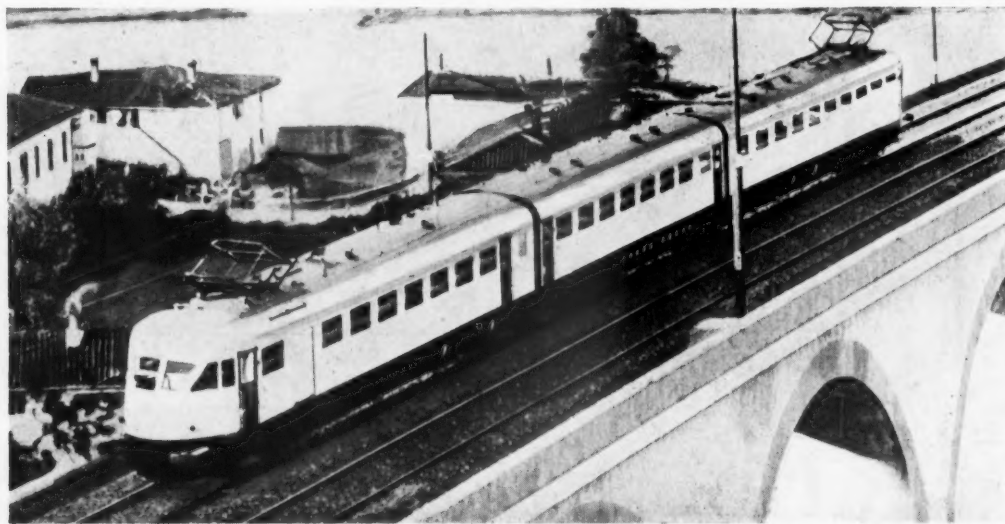
The d.c. 650-V. 3rd-rail system was applied in 1901 on the section between Milan and Varese (58 km.), and extended in 1902

to Porto Ceresio (a further 14 km.). The 3-phase system was tried out in 1902 on the Valtellina lines (Lecco—Colico—Sandrio, and Colico—Chiavenna, a total of 105 km.). The experiment with 650 V. d.c. was successful, but it was impossible to increase the voltage because of the small progress at that time in the technique of constructing d.c. motors, and this necessitated the placing of substations very near to each other (8 to 12 km.). Also, it was impossible to supply high power.

The operation of the Valtellina lines, electrified with 3-phase current, proved very satisfactory, and consequently, in 1911, this system was applied to the Ponte-

Method (1) is uneconomical, as the average period of use of the machinery, owing to the characteristics of railway loads, is very low. Method (2), owing to the coexistence of two installations at different frequencies, is very expensive. The third method is not very satisfactory from the economic point of view, as it requires two voltage transformations and a frequency conversion, and consequently a considerable percentage of the power is lost.

By method (4) it would be possible to have only a voltage transformation and a frequency conversion, but as the distance between two three-phase substations is some 13 or 20 km., according to the amount of traffic, it is easy to realise that substations would be very numerous, and therefore it would be excessively expensive to instal machinery for frequency conversion in all of them. It remains to be



Three-car streamline train of the type adopted by the Italian State Railways for high-speed luxury services between large towns

teries; one with 650-V. d.c., 3rd rail; and one with 3-phase a.c. at 3,000 V., 15 cycles. It was proposed to test this high-voltage system on a line where the traffic was considerable. It was the first time a contact line had been fed at such a high voltage; the choice of the low frequency was made in order to avoid the installation of reduction gearing between the electric motors and the axles of the locomotives, and this at the same time reduced the rail losses.

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decimo-Busalla line, near Genoa, which crosses the Apennines through the Giovi Pass, with gradients up to 35 per cent., and very heavy in traffic. For this new electrification the voltage was increased to 3,700, and the frequency raised to 16.7 cycles. These experiments actually proved that electrification, instead of being satisfactory only on lines with small traffic, had a better and more rational application on heavily-occupied lines.

Railway electrification in the following years until 1928 was all carried out with 3-phase current, 3,700 V., 16.7 cycles. At the end of 1927, there were 1,200 km. of lines electrified on this system, 725 km. of which were double track.

For the production of electric power at "railway frequency" (namely, 16.7 cycles) several methods can be used:—

- (1) Direct generation by power stations equipped only with 16.7-cycle machinery.
- (2) Direct generation by power stations equipped with railway frequency and industrial frequency machinery.
- (3) Conversion from industrial frequency to railway frequency by means of frequency-conversion substations situated at the most important points of the railway system.
- (4) Distribution of the electric power at industrial frequency, and conversion to 16.7 cycles in all substations feeding the contact line.

pointed out that methods (1), (2) and (3) require the construction of high-voltage transmission lines for carrying power at only 16.7 cycles.

The choice of the best system is really an economic problem, and its solution may differ from country to country, or even within a country. The methods adopted generally in Italy were those given under (2) and (3). In both cases a low-frequency high-tension (60 kV.) line runs alongside the railway and feeds the various substations.

Fixed and Mobile Substations

The substations are very simple. They consist generally of high-tension circuit breakers (60 kV.), step-down transformers (60,000 to 3,700 V.), and low-tension circuit-breakers (3.7 kV.), connected to the contact line feeders, besides the necessary section switches. Transformers generally are of the single-phase type, and often four in number, three being in operation and one kept as a reserve. Their individual capacity varies, according to the importance of the substation, from 1,500 to 500 kW., and their number also varies from a minimum of three to a maximum of seven.

The Italian State Railways have also mobile three-phase substations, used

* The author expresses his grateful thanks to Dott. Ing. Enrico Savio, of the Italian State Railways, for his careful checking of this article, and for the many suggestions and helpful assistance rendered during his period as Liaison Officer with the Transportation Sub-Commission of the Allied Commission in Italy

either in substitution of fixed substations which are out of service, or to operate with these in case of temporary increase of traffic. They are fitted up on special wagons with two six-wheel bogies, and consist of one three-phase transformer in oil (2,250 kW.), and two self-acting circuit breakers in oil (one in the 60 kV. circuit, and one in the 3.7 kV. circuit). The total weight is approximately 90 tons.

The contact line is overhead and bipolar, the rails acting as a third phase. The suspension is either transversal or longitudinal. In the first case, the contact wire is suspended directly from the brackets through insulators. In the second case, the contact line is suspended from a supporting rope, which in its turn is suspended from brackets. In the first system of suspension, the contact line is laid in continuous catenaries, and therefore its height above rail level varies from a maxi-

locomotives are passing the junctions. The three-phase overhead junction switches always have some sections of contact line insulated in order to guide pantographs during their passage under them; whilst electric locomotives have two pantographs for each phase, at front and rear, so that motor supply may be continuous.

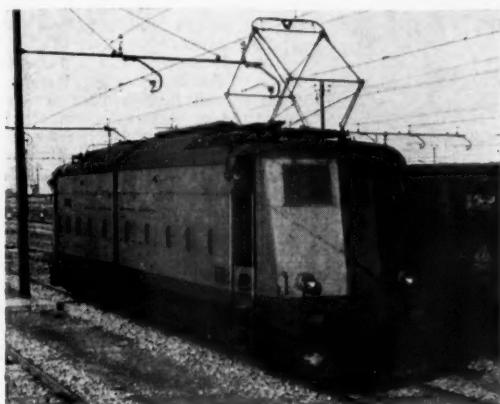
High-Voltage d.c. Experiment

In 1928 and 1929 two more electric traction systems were tried, one being a three-phase industrial frequency supply of 10,000 V., 45 cycles, on the Rome-Avezzano line (108 km.), which was extended as far as Sulmona (64 km. further) in 1933; and the other a 3,000 V. d.c. system on the Benevento-Foggia line, (101.4 km.), extended in 1931 to Naples (97.7 km. further). The line has steep gradients, up to as much as 23 per cent.

The first experiment was prompted by the

To overcome the fact that the speed of a 3-phase induction motor is constant, and cannot conveniently be regulated by resistance methods, several different speeds are obtained by coupling the motors in parallel or in cascade, and by changing the number of poles. All these considerations apply to the 3-phase system at 10,000 V., 45 cycles, which, when compared with railway frequency, has the advantages previously mentioned, but on the other hand necessitates a step-down transformer in the locomotives, reduction gearing to the driving axles, and increased complication of contact line construction.

The points in favour of d.c. traction arise mainly from the characteristics of the series motor, namely: automatic regulation of torque and speed; resistance to overloads; and the ability to function normally at low speeds in the event of the voltage falling. The simplicity of the



Direct-current "E636" class locomotive of the Italian State Railways at Chiasso

(Photos)



One of "E636" locomotives working a Bologna-Milan goods train

[E. J. N. Hayward]

mum at the point of suspension to a minimum at the lowest point in the curve of the catenary. At high speeds this periodical variation of height causes synchronous oscillations on the pantographs, and consequently considerable sparking. Therefore, the distance between poles must be reduced progressively as speeds are raised.

In longitudinal suspension the contact line is kept at an almost constant height above the rails, and is altogether a very flexible system. It can be used, however, only on straight sections and in the open air, but not in stations or yards. Transverse suspension is used on curves, in tunnels, and in stations. The distance between poles in transverse suspension is 30 to 35 m. for speeds up to 50 km.p.h.; and 20 to 25 m. for speeds over 50 km.p.h. on sections in the open air. These distances are reduced 20 m. and 10 to 15 m. respectively in tunnels. In longitudinal suspension, distances of 60 m. between poles may be adopted.

Poles and brackets are metallic. Each phase consists of two copper wires of 11.3 mm. dia. (total section, 200 sq. mm.), placed 6 cm. apart from each other. The distance between the two overhead phases is 96 cm.

Since the two overhead phases are fairly close to each other, it is necessary to provide special apparatus on the junction switches, and on the contact devices of electric locomotives, to ensure continuity of supply, and to avoid short circuits between the phases when the electric

fact that the increased frequency permitted a considerable reduction in the weight of transformers and machinery, while the elimination of the railway frequency simplified the supply of power required, thus making special low-frequency (17.7-cycle) lines superfluous. The high voltage enabled a reduction to be made in the section of contact wires; or, alternatively, the substations to be placed further apart.

The 3,000-V. d.c. experiment was rendered practicable by the improvements effected in direct current motors, enabling them to be fed at high tension without damage to the collector, thanks to improved insulation technique, and the adoption of commutating poles.

Low-frequency 3-phase traction, which was developed highly at the time, had given very satisfactory results. As well as the convenient supply system, and the robustness of the 3-phase motor, other advantages were: the possibility of direct coupling to the driving axles, and of feeding at a fairly high tension; easy starting; and automatic regenerative and resistance braking. These assets were counteracted by the constant-speed motors; the considerable reduction in torque resulting from a fall in line voltage; the necessity of a small air-gap between rotor and stator, to avoid lowering the power factor too much; the fact that resistance and regenerative braking are impossible when there is a reduction in line voltage; and the need for resorting to special measures to obtain an equal distribution of the load among the driving units of multiple-unit trains.

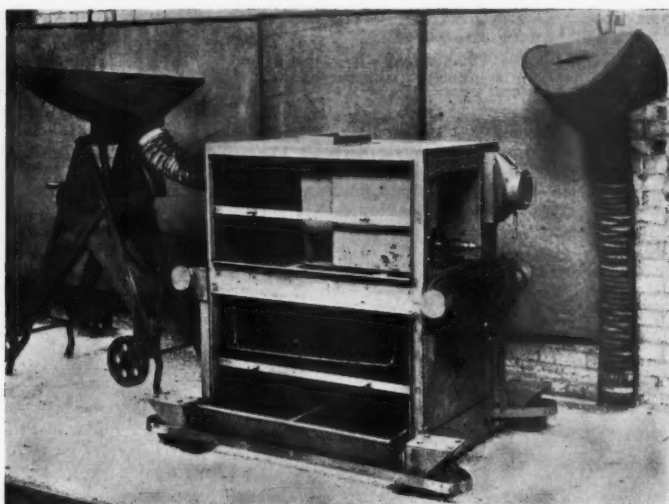
single-pole contact line; the possibility of spacing substations fairly far apart (35-40 km.), and of using industrial frequency current at the rectifier substations; the easy distribution of the load in the case of multiple-unit traction; and the possibility of braking even when no current is available on the line—these are other advantages, which are offset, however, by the fact that the locomotives and substations are more complicated, and automatic regeneration is not possible.

In the experiment on the Benevento-Foggia line, both rotary converters and steel-tank mercury-arc rectifiers were used for rectification. The results were highly satisfactory, and in due course, progress in the construction of rectifiers permitted the rotary machines to be eliminated.

From 1934 onwards, all new electrifications in Italy were d.c. at 3,000 V., and the voltage gradually rose to 3,400 V. Exceptions were made in the case of a few electrified 3-phase lines at a frequency of 16.7 cycles in the Piedmont and Liguria areas, where this system had been adopted widely. The d.c. system at 3,000 V. was so successful that no further consideration in planning new works was given to the 3-phase system at 10,000 V., 45 cycles. The low-frequency 3-phase system, now used on 1,825 km. of line (835 km. of which are double-track) will be replaced by d.c. at 3,400 V. when conditions in the country permit conversion. The experimental industrial frequency 3-phase system on the Rome-Sulmona line was rebuilt as standard d.c. after the war.

Removing Dust from Rotary Machines in Electric Trains

Equipment designed by London Transport for clearing ventilation ducts of rotary machinery in trains



Dust extractor, adjustable funnel, and hood

AMONG the many difficulties with which the Underground railway system of London Transport has to contend is the accumulation of tunnel and other dust in the ventilating ducts of high-speed rotating units on the rolling stock. This dust, by becoming packed in the ducts, causes a tendency to overheating and upsets the balance of the machines.

The normal method of removing dust, by blowing air from a compressing plant through the channels, never has been considered an ideal one, since its net result is to stir up the dust and allow it to deposit itself in another place where it is equally unwelcome. It is also detrimental to the operatives' health and requires provision of masks and other equipment.

Experiments have been proceeding, therefore, with a view to providing an apparatus which will not only blow a jet of air into the machine to be cleaned, but will draw the dust-laden air into an exhaust chamber and deposit the dust, allowing the clean air to be expelled. A large vacuum machine was made at Neasden Depot, from material ordinarily available, and built up in conjunction with the compressed-air jet into a self-contained unit.

A considerable amount of experimental work was carried out, and various materials, such as straw, coke and horse-hair, were utilised in an attempt to ascertain the best filtering medium. Eventually a machine was evolved which, although bulky and cumbersome, functioned in a

satisfactory manner, and it was agreed that a firm of ventilating engineers be approached with a view to the design of a compact machine on the principles found by the experiments to be successful. Collaboration between this firm and Acton Works Plant Section finally solved the problem.

The resulting extractor is contained in a metal case 2 ft. 4 in. by 3 ft. 1 in. by 4 ft. high. Its chief merit is that it can be used on the rolling stock *in situ*, and it is fitted with small wheels to allow it to be run along under the cars in the examination pit. The equipment consists of a fan driven by a 1-h.p. motor, which sucks in the dust-laden air. This air is drawn through a filter, consisting of 25 bags stuffed with sisal grass, which separates the dust and deposits it in a removable tray at the bottom of the container.

As the filter bags become impregnated with dust, they can be cleaned by agitating a rod which projects for the purpose from the extractor. The clean air is expelled through the outlet grille on the top of the box.

Two special fittings were designed and constructed at Acton to connect the extractor to Metadyne machines and motor generators, both of which are situated under the cars. A metal funnel, designed to fit over the air exhaust of Metadyne machines, is connected by a flexible hose to the extractor intake. The funnel and hose are mounted on a scissors type of elevator which can be raised or lowered by a screw operated by a handwheel. The special fitting for use with motor generators consists of a hood which is held over one end of the machine and held in position by cords. This also is connected to the extractor, when required, by means of a flexible hose.

The current supply for the extractor motor is taken from the 600-volt d.c. overhead shop trolley circuit, and fed to iron-clad switch-controlled sockets distributed along the pit wall. The case of the machine is earthed efficiently by the use of three-pin plugs. The air for the jet is supplied from the compressed-air main in the shop, a connection being located adjacent to each electric supply socket.



Using the funnel attachment to catch dust extracted from Metadyne control equipment



The hood and hose connected to the extractor for cleaning a motor generator

RAILWAY NEWS SECTION

PERSONAL

Sir Samuel R. Beale has retired from the Chairmanship of Guest, Keen & Nettlefolds Limited. Sir Samuel Beale, who has been succeeded as Chairman by Mr. J. H. Jolly, is to retain his seat on the board, and he will continue as Chairman of Joseph Sankey & Sons Ltd. Sir Samuel Beale is a Director of the London Midland & Scottish Railway Company.

Sir Frederick Bain, President of the Federation of British Industries, has returned to England from his visit to Canada, the United States and Australia.

The Cabinet has nominated Sir Bernard Gilbert, a Second Secretary to the Treasury, to be an additional member of the Economic Planning Board.

The British Electricity Authority has appointed Mr. D. W. Coates to be Chief Accountant, and Mr. E. R. Wilkinson, Commercial Manager. Both have held executive posts with the Central Electricity Board.

We regret to record the death on September 24 of Mr. John Cromey Lyle, C.V.O., who retired in 1913 from the service of the North Western Railway, India, having served latterly as Engineer-in-Chief, Delhi Durbar Railways.

Mr. P. S. Chalmers, Treasurer, Western Region, Canadian National Railways, has been appointed Assistant Treasurer at headquarters.

Mr. M. L. G. Balfour has been appointed Chief Information Officer, Board of Trade. His duties will include those previously performed by the Director of Public Relations, and he will also supervise Overseas Information activities, which Mr. R. K. Bacon will continue to direct. Mr. Balfour has been Director, Information Services Control Branch, Control Commission for Germany, 1946-47.

Mr. Frank C. S. Evans, K.C., has been appointed General Counsel of the Canadian Pacific Railway Company. Mr. J. Q. Maunsell, K.C., Solicitor to the company at Toronto, succeeds Mr. Evans as General Solicitor of the C.P.R.

L.M.S.R. APPOINTMENTS

Mr. B. J. Pilkington, District Controller, Warrington, to be Assistant District Operating Manager, Manchester (Western).

Mr. T. Eaglesfield, Assistant, Office of Divisional Superintendent of Operation, Crewe, to be District Locomotive Superintendent, Sheffield.

Mr. W. Bramley, Assistant, Office of Divisional Superintendent of Operation, Derby, to be District Locomotive Superintendent, Bletchley.

Mr. F. Bebbington, Running Shed Foreman, Bletchley, to be Assistant District Locomotive Superintendent, Salford.

Mr. William Merton Neal, C.B.E., Chairman & President of the Canadian Pacific Railway Company, who is at present on a visit to Great Britain, was born at Toronto on June 20, 1886, and was educated at Wellesley School there. Mr. Neal joined the Canadian Pacific in 1902, and obtained wide experience in several departments of the company. In 1917 his services were lent, and he became General Secretary of the Canadian Rail-

President of the Canadian-Australasian Line, and a Director of a number of other companies. He was made a C.B.E. in 1944.

Sir Charles Newton, a Director, and lately Chief General Manager, of the L.N.E.R., has been appointed Chairman of a commission which the South African Minister of Transport has constituted to inquire into the rating system and financial structure of the South African Railways. The two other members of the commission will be South African economists with wide commercial experience in the Union. It is expected that Sir Charles Newton will leave England about the beginning of December, and the formal work of the commission will commence next January. The investigation is expected to extend over several months.

Mr. W. H. Salkield, General Manager, Sierra Leone Government Railway, who, as recorded in our September 12 issue, has been appointed General Manager, Gold Coast Government Railway, joined the North Eastern Railway in 1915. In the first world war he was from 1918-19 2nd Lieutenant (Pilot) in the R.A.F., serving in Egypt and Palestine. He rejoined the North Eastern Railway in 1919, on the staff of the District Goods Manager, Hull, and from 1921 to 1926 he was engaged on work in connection with the King George Dock. In 1926 he was appointed Assistant Traffic Superintendent, Sierra Leone Government Railway; and he was made Assistant to General Manager (Traffic) in 1942. He subsequently became Acting Traffic Manager, and remained in that post until appointed General Manager in April, 1945. In May, 1947, Mr. Salkield represented the Sierra Leone Government at the Anglo-French Communications Conference held at Dakar, French Senegal.



Karsh

Ottawa

Mr. W. M. Neal

Chairman & President, Canadian Pacific Railway Company, who is visiting Great Britain

way War Board. Returning to the C.P.R. in 1920, he became General Manager, Western Lines, in 1927; Vice-President, Western Lines, in 1934; and Vice-President and a Director of the company in 1942. In February, 1947, he was elected Chairman & President. During the recent war, Mr. Neal was Canadian representative on the Transportation Equipment Committee of the Combined Production & Resources Board of Great Britain, the United States and Canada, and later Chairman of a Canadian committee of the same title, and he still heads a Canadian Ministry of Reconstruction committee. In 1940 and 1941 he accomplished much of the organisation of the then newly-forming subsidiary, Canadian Pacific Air Lines, and was for a time its President, and later Chairman. Mr. Neal is Chairman of the joint board of management of the St. John Ambulance Association and the Red Cross in the province of Quebec, and a member of the Montreal Chamber of Commerce. He is Chairman of Canadian Pacific Steamships,

Mr. W. Mackenzie, B.Sc., M.I.C.E., Assistant Engineer for Docks (North Eastern Area & Great Central Section), L.N.E.R., who, as recorded in our August 22 issue, has been appointed Chief Engineer for Docks (North Eastern Area & Great Central Section), graduated as B.Sc. in engineering at Edinburgh University in 1907, and joined the staff of Rendel & Robertson, Westminster, and was engaged on dock and harbour construction work. In 1911 he was appointed an Assistant Engineer, Port of London Authority, at Surrey Docks, and in 1912 he was posted to new works at Tilbury Docks. In 1914 Mr. Mackenzie became Acting Resident Engineer at Tilbury Docks, and under the Chief Engineer to the Authority he was in charge of the construction and operation of the military bridge across the Thames between Gravesend and Tilbury in the 1914-18 war. After a period of duty at head office he was appointed Resident Engineer at the Royal Victoria, Albert and King George Docks. In 1926 the Authority commenced a programme of major

**Mr. W. H. Salkield**

Appointed General Manager, Gold Coast Government Railway

**Mr. W. Mackenzie**

Appointed Chief Engineer for Docks (N.E. Area & G.C. Section), L.N.E.R.

**Mr. C. N. Gallie**

General Secretary, Railway Clerks' Association, 1940-47

improvement works at the India, Millwall and Tilbury Docks, and Mr. Mackenzie was appointed Resident Engineer at India and Millwall Docks, and later was transferred to Tilbury, where the works comprised the new entrance and dry dock, 110 ft. wide by 1,000 ft. and 750 ft. long, respectively, and the passenger landing stage. In 1931 he entered the service of the L.N.E.R. as Assistant Engineer for Docks. Many improvement works to the company's docks at Hull, Grimsby, Immingham, Hartlepool and Middlesbrough have been carried out during this period; and since the war a large programme of reconstruction and extension works, estimated to cost about £7,000,000 in all, has been developed in accordance with the company's policy for the large-scale improvement of its docks, and a start has been made on several urgent items.

Mr. C. N. Gallie, who retires next month from the position of General Secretary,

Railway Clerks' Association, was born at Dornoch, Sutherlandshire, and joined the North British Railway as a boy messenger in 1903, later serving as a junior clerk. He subsequently became a personal clerk to the Goods Agent at Sheepford, Coatbridge, and was afterwards promoted to the Forwarding Department at Coatbridge Central, and from there to the Chief Clerkship at Parkhead, Glasgow, in 1915, to deal with the abnormal situation which had developed there due to the concentration of output of munitions. In 1919 Mr. Gallie joined the staff of the Railway Clerks' Association as Assistant Secretary in charge of Stationmasters' and Supervisors' Questions; in January of the next year he was appointed Scottish Secretary to the Association, and became the first to occupy that position. He held that post until January, 1940, when he was appointed Chief Assistant Secretary. He became General Secretary in August, 1940. During his period of office as Scottish Secre-

tary of the R.C.A. Mr. Gallie was twice President of the Scottish T.U.C. and served on the Scottish Economic Committee, which was appointed to advise the Secretary of State for Scotland. He has been a member of the General Council of the Trades Union Congress since 1940, and was appointed a Director of Cable & Wireless Limited in January of this year.

Mr. James Cunningham, B.Sc., Assistant to District Engineer, Bangor, L.M.S.R., who, as recorded in our August 8 issue, has been appointed District Engineer, Abergavenny, was educated at Perth Academy and St. Andrew's University, and took his B.Sc. degree in engineering in 1922. He served during the 1914-18 war with the Royal Engineers. Mr. Cunningham joined the L.M.S.R. in the District Engineer's Office, Perth, in 1923. He was transferred to the Divisional Engineer's Office, Glasgow, in 1935, and became Assistant to District Engineer, Bangor, in 1937.

**Mr. James Cunningham**

Appointed District Engineer, Abergavenny, L.M.S.R.

**Chief Inspector G. Partridge**

For 20 years responsible for trains carrying important persons over the G.W.R., who has retired

**Mr. A. H. Coleman**

Who has 60 years service with the B.A. Great Southern Railway, and is at present in England

Chief Inspector George Partridge, M.B.E., Great Western Railway, who, as recorded in our October 3 issue, has retired, after 52 years service, has been responsible during the last twenty years for the trains carrying royalty and other important persons on journeys over the company's system. Since 1927 he has made seventy-seven journeys with members of the British Royal Family alone, apart from visiting royalty. During the war he was in charge of the special trains used by Mr. Churchill, General Eisenhower and the chiefs of staff travelling on secret missions. Other important personages who have been in his safe charge are the King of Norway, the Regent of Iraq, Mrs. Roosevelt and Mr. Winant. His most memorable job was during the Dunkirk evacuation, when he was sent to Redhill to route and speed through some 300 special trains from the Channel ports to points on the G.W.R. Chief Inspector Partridge was chosen specially as guard on the rail motor service which the G.W.R. introduced in the Stroud Valley of Gloucester in 1903. He subsequently became inspector of those services when they were extended to Weymouth, Plymouth and South Wales. Due to retire when he was 65, Chief Inspector Partridge has remained with the G.W.R. until now at the special request of the management.

Mr. A. H. Coleman, who is still on the staff of the Buenos Ayres Great Southern Railway after 66 years railway service, is at present visiting England. Mr. Coleman joined the Great Western Railway at Pontycymmer in South Wales in January, 1882 (before the conversion of the broad gauge), and resigned in 1887 to take up a position on the Buenos Ayres Great Southern Railway. He is now nearly 80 years of age, but is not contemplating retiring, and is returning to Argentina shortly to resume his duties as General Manager's Representative at Bahia Blanca. To mark his 60 years service with the company, the board of the B.A.G.S.R. recently presented Mr. Coleman with a silver salver.

Sir Roger Hetherington has been elected President of the Institution of Civil Engineers for 1947-48.

BRITISH TOURIST & HOLIDAYS BOARD
The British Tourist & Holidays Board has announced that, on the invitation of the President of the Board of Trade, Mr. Ben H. Russell (Director of the Cunard Steam Ship Co. Ltd., and of Cunard White Star Limited) has joined the Board, in place of Sir Eustace Missenden, who resigned on becoming Chairman of the Railway Executive.

RAILWAY EXECUTIVE COMMITTEE
Subsequent to the appointment of Lord Ashfield as a member of the British Transport Commission, he has resigned his membership of the Railway Executive Committee. The Minister of Transport has appointed Mr. A. B. B. Valentine in his place to be a member of the Railway Executive Committee. Mr. Valentine recently was appointed by the Minister of Transport to be a member of the London Transport Executive.

Mr. N. S. Sen, Chief Transportation Superintendent of the Great Indian Peninsula Railway, has been appointed General Manager of the Bombay, Baroda & Central India Railway, in place of Mr. K. C. Bakhle, recently appointed Chief Commissioner of Railways, India.

G.W.R. STAFF CHANGES
Mr. M. G. R. Smith, Assistant Engineer (Maintenance), Paddington, to be Divisional Engineer, Taunton, on retirement of Mr. F. Holland, from December 1.

Mr. H. E. B. Cavanagh, Assistant to the Architect, Paddington, to be Assistant Architect, Paddington.

Mr. C. W. James, Assistant to Stationery Superintendent, to be Acting Stationery Superintendent, Paddington, on retirement of Mr. H. W. Croft, from December 1.

Mr. G. E. R. Penney, Assistant Divisional Superintendent, Worcester, to be Assistant Divisional Superintendent, Newport.

Mr. W. J. Morris, Chief Clerk, Divisional Superintendent's Office, Exeter, to be Assistant Divisional Superintendent, Worcester.

Mr. J. F. H. Tyler to be Assistant to Signal & Telegraph Engineer, Reading.

SOUTHERN RAILWAY STAFF CHANGES
Chief Civil Engineer's Department
Mr. A. B. Chester, New Works Engineer, to retire.

Mr. C. W. King to be New Works Engineer.

Mr. A. H. Cantrell to be Divisional Engineer, London East Division.

Mr. S. L. Furnivall to be Divisional Engineer, London West Division.

Mr. R. Restall to be Divisional Engineer, Central Division.

Brigadier W. Marshall Clark, General Manager, South African Railways, and Mrs. Clark gave a cocktail party at South Africa House on October 2 prior to their return to South Africa. The party was attended by a representative gathering of British railway officers and manufacturers of railway equipment. Brigadier Clark in a short speech expressed his appreciation and thanks for the welcome he had received in this country. It was his first visit since he left for South Africa with his parents at the age of two.

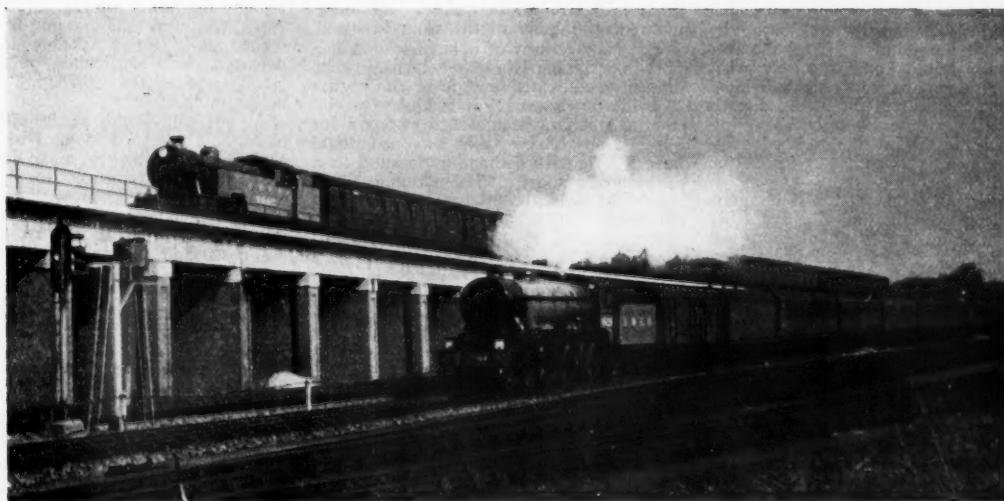
GOVERNMENT CHANGES
Mr. G. R. Strauss, Parliamentary Secretary, Ministry of Transport, has been appointed Minister of Supply, succeeding Mr. John Wilmot, resigned.

Mr. H. T. N. Gaitskell succeeds Mr. E. Shinwell (appointed Secretary of State for War) as Minister of Fuel & Power; he was previously Parliamentary Secretary to that Ministry.

Other appointments include that of Mr. P. J. Noel-Baker as Secretary of State for Commonwealth Relations, succeeding Lord Addison, appointed Lord Privy Seal.

Junior appointments include those of:—Lt.-Colonel D. R. Rees-Williams as Parliamentary Under-Secretary of State, Colonial Office; Mr. P. C. Gordon-Walker, Parliamentary Under-Secretary of State, Commonwealth Relations Office; Mr. A. Robens, Parliamentary Secretary, Ministry of Fuel & Power; Mr. C. R. Hobson, Assistant Postmaster-General; Major J. Freeman and Mr. J. H. Jones, Joint Parliamentary Secretaries, Ministry of Supply; Mr. A. G. Bottomley, Secretary for Overseas Trade; Mr. L. J. Callaghan, Parliamentary Secretary, Ministry of Transport.

Progress of L.N.E.R. Shenfield Electrification Scheme



The new flyover at Ilford, opened on October 6, is an important stage in the civil engineering programme connected with electrification from Liverpool Street to Shenfield

"A New Era of Transport"

Mr. T. W. Royle's Presidential Address to the Institute of Transport

Since its inception just over a quarter of a century ago, the Institute of Transport has witnessed some violently contrasted periods in the life of the nation, varying from the doldrums of acute industrial depression to the feverish effort inseparable from waging a world war.

These extreme variations in the tempo of national activity have brought many changes in the conduct of industry, a marked feature having been exceptional Government intervention, from which transport has not remained immune.

Considerable discussion has taken place as to how the output of industry can be speeded up and increased. Two broad conclusions have been reached:—

(1) In present circumstances, the Government has a responsible part to play by framing its industrial and manpower policies with the object of doing everything possible to remove the shortages of equipment, fuel, and materials which impede the efforts of the industrial machine to develop itself so as to produce commodities in sufficient quantities both for home and export requirements.

(2) The immediate problem is to make the most effective use of available resources.

The first conclusion is primarily a matter for the Government, and to equip itself with adequate legislative power to deal with the situation, the Supplies & Services (Extended Purposes) Act was placed on the Statute Book at the end of the last session of Parliament. Since then, steps have been taken by Ministers with the declared object of increasing industrial production.

Consequent on the complementary programming of exports and imports, and the determination of the volume of internal trade, it has been deemed an advantage for each industry to be given an attainable target for output, so that every factory may know exactly what is expected of it in the national effort.

FUNCTION OF MANAGEMENT

The function of management is to formulate the plan of operations to reach the fixed goal, and, for its execution, secure the utmost co-operation from all departments and grades.

Each organisation should produce a clear and complete outline of its control, so that it may be readily understood by all engaged in the industry. Every member of the staff should know precisely what his or her duties are, and each individual as far as practicable should be directly responsible to one person only. This implies real leadership at all levels of management which is essential to foster the team spirit.

It is persistently suggested in some quarters that joint consultation will play a big part in vitalising our national industrial organisation, but it might be fairly argued that the joint consultation most likely to produce tangible results is that which takes place between the various departments or grades to ascertain the best means of executing a firm's plans.

It is the job of those in authority to be wise leaders, and they should be prudent enough to call on the knowledge and experience of their staff, even though the latter's points of view need not necessarily be accepted. Any form of joint consultation which results in shelving managerial responsibility or weakening the management's authority, will impede rather than help operations. It is extremely desirable

that staffs should see and feel that things are being run on fair lines and that promotion is obtained by aptitude and merit. In regard to the latter point, it is important that, other than in the case of positions requiring exceptional qualifications, all vacancies should be advertised inside a firm before candidates are invited from outside.

SHORTER WEEK AND SHIFT SYSTEM

It appears to me to be a matter for serious thought whether any contribution was really made to the national economy by the pressure for a reduced working week, and the antipathy to entering any industry which is worked on the shift principle, or to the extension of the principle of such working.

As we have seen, the introduction of the five-day week in so many businesses upset the rhythm of the transport industry and caused congestion by the refusal or inability of firms to accept delivery or despatch consignments on Saturdays.

It can hardly be an over-statement to say that the establishment of a sense of responsibility, both towards the nation and industry, constitutes one of our greatest problems. Whilst my remarks to this point have been applicable to industrial enterprises generally, I suggest they are all germane to transport.

It is self-evident that the greater industrial production visualised will throw an additional strain on our transport system, which has been seriously depleted owing to wartime causes, and the need for Government assistance to increase transport resources is no less imperative today than it was during the summer when the Prime Minister indicated the Government's concern at the position.

Simply defined, the target for the transport industry is the provision of the most efficient, economical, and safe transit for passengers and goods which circumstances will permit. This implies that each unit of organisation should have a goal to aim at so that the general target of the whole may be reached. It is of paramount importance that industrial and other users of transport should state promptly and clearly their transport requirements so that adequate provision can be made by the maximum diagramming of the work involved.

The management of a large-scale transport undertaking is an art which must be diligently cultivated and is in the nature of a life-time's work. It is highly specialised and cannot be regarded as a job for all. In any sane system no one should have the right to demand promotion to a position of authority. The granting of any such right would be fatal to discipline and efficiency.

It cannot be denied that in large concerns where the organisation extends over a considerable area, the tendency to over-centralisation is ever present, and, unless checked, results in a kind of headquarters bureaucracy and the virtual disappearance of local autonomy, with a complementary loss of initiative and growth of inertia, both detrimental to success. There is also no doubt that over-centralisation is the root cause of the absence of proper personal relationship between the management and the staff which is one of the attractive and valuable features of the small enterprise. The danger of over-centralisation may arise in an extreme form within that section of our industry which will be

nationalised, and careful thought should be given to prevent it.

Part of the price of progressive management is the constant review of all phases of an undertaking's activities, including methods of working, no matter how long established. This induces the reflection that great reliance is placed nowadays on the use of statistics in the control of business, and there can be little doubt that properly compiled and interpreted, statistical information is of great value. It is, however, important to remember that statistics should be regarded only as a tool of management.

This prompts me to inquire, are we not inclined to be too complacent if, when going through our figures, we find that they show an improvement on the previous comparative period? Whilst this is all to the good, it may well have been that the standard of efficiency of the basis period was not so high as more thorough management could have made it, employing the same physical assets. A more detailed analysis of the component parts of the working might have revealed weaknesses and led to adjustments.

I hope you will forgive me if I turn to that form of transport, namely, the railways, with which I have been most intimately associated, to quote one or two examples of what is in mind.

FREIGHT SHUNTING ANALYSIS

My first is freight shunting, which is a very expensive item in railway operation. Whilst every yard of reasonable size compiles statistics such as number of wagons shunted, engine power expended, staff costs, etc., showing the corresponding figures for the previous year, it was felt that in a lot of cases this did not go far enough, and many years ago on some railways what might be termed "flying squads" were created. Their duty was to watch the workings at large yards, say for a week, make detailed records of every minute of shunting time and engine power used, bring out the working and standing times, and the number of staff on duty each hour of the day, and so on. These particulars were then closely analysed by experts and adjustments made, with resultant economy.

In some cases, the figures which were obtained formed the basis of justification for expenditure in improving the layout. Subsequently this detailed analysis was applied to the flows of traffic through various yards, complete details being taken of the formation of trains as they arrived and departed, with particulars of the wagon labels showing the originating and destination points.

As a result of this analysis the staging of traffic from yard to yard was reduced, as it was possible to make up through trains from yards nearest to the point of origin of the traffic to yards nearest the destination points. This resulted in an improvement in transit with reduced shunting costs and other benefits.

The value of this practice of traffic analysis was demonstrated during the war when many revisions of routes were made to ease congested yards and relieve overburdened lines.

Another example is the movement of engines within motive-power depots. Detailed particulars are taken of the time each engine takes in passing through the various operations, such as turning on turntables, coaling, taking of water, and the dropping or lifting of fires. Such an analysis brings out clearly at what stage of the work delay arises, and indicates whether it is due to bad layout, shortage

of facilities, or of staff, etc., at a particular period. It also shows where economies can be effected. In a number of cases of which I am aware, altered layouts have been introduced so as to reduce or obviate the weaknesses revealed.

A similar technique has been adopted in analysing on a "time study" basis the various operations in a goods yard. These include the placing of wagons ready for unloading, unloading of wagons, trucking from wagons to the cart front, loading of traffic on to road vehicles for town delivery, etc.

From these details any necessary adjustments in working are made. Where operations are shown to be unduly costly, rearrangement of the layout of the stations and methods of working are made, and mechanical aids introduced in the shape of conveyor belts, traversers, the movement of wagons without locomotive power, etc.

It will thus be seen that a wide field is open for a prudent use of precision analysis of transport operations which amply repays institution and provides the management with a valuable instrument. It is important to point out that in schemes entailing large capital expenditure there should be an efficient system of back-checking to establish how far expectations have been realised, but, just as it is more difficult to analyse the working processes of a transport organisation compared with productive methods in a modern factory, so it is necessary to ensure that the back-checking system does not look for conclusive answers too early.

THEORETICAL TRAINING

Can the Institute spread its facilities for the theoretical training of management further so as to reach all grades of transport personnel? It is appreciated that to do so will involve an extension in the size and, perhaps, influence of the Institute and that it may be necessary to establish a sort of liaison between the transport concerns and the Institute.

The bigger transport undertakings operate internal schemes of education, but these are usually departmental. For example, on the railways there are classes for teaching signalling and kindred subjects. There are also schemes of training for the clerical grades devised to secure a certain standard of general efficiency. It may well be that some steps might be taken to dovetail, where practicable, these domestically conducted training schemes with the Institute's courses and so provide a sort of progression in learning which would act as an incentive to students.

Opportunities to obtain the higher posts in business should continue to be open to those whose training has been obtained largely in the school of experience. I recall that during a series of addresses on "Education for Transport" which I gave to various sections of this Institute within the last three years, the point was made that qualities which are the most difficult to assess are among the most valuable. In other words, though the examination is an important element, it can only be regarded as a part of the scheme of promotion.

It is essential, also, to consider the successful candidate's personal qualities, his zeal and general bearing, his ability to take responsibility, to handle staff, and to think through an actual practical problem clearly. No written examination can successfully measure these qualities which together make up a large proportion of what is called "leadership."

This Institute is uniquely placed to give valuable assistance in building up the new structure of transport by anticipating prob-

lems to be faced and expressing informed opinions as to their solution. As I conceive it, the job of the new Transport Commission will be to think out what unification of transport means and to decide how an improved system can be built up at less cost.

For instance, have we in this country too many ports and are they designed and equipped to secure the speediest turn-round of all the vessels using them? What about our inland waterways? There are some 2,000 miles of canal and inland waterways open to navigation, but the tonnage carried on them is steadily declining.

Almost a third of these waterways is railway owned, and the railway companies have stated that in 1938 they spent three times as much on the maintenance of canals as they received in tolls. Passenger traffic on the canals has practically ceased, and the question now arises, should they be regarded as an obsolete form of goods transport? On the other hand, there is

some evidence to show that certain estuarial waters have carried increased tonnages during recent years in the face of road and rail competition, and it may well be that some commercially sound development is possible.

Progress was being made by the railways before the outbreak of the war in using road transport for the conveyance of goods for part of their journey by concentrating what is known as "sundries" traffic at the larger goods depots which served as a railhead for the surrounding area up to 15 to 20 miles, both for delivery and collection of goods.

Arising from the successful experience in regard to goods traffic, the question arises, cannot a similar principle be adopted so far as passenger traffic is concerned, that is, by making the larger passenger stations railheads for certain areas where passengers would change from rail to road vehicle to continue their journeys to surrounding villages.

Swedish Road Haulage Delegation Entertained in London

On October 2, the Road Haulage Association of Great Britain entertained to luncheon at Grosvenor House, Park Lane, W.1, members of the Swedish Road Haulage Association, who are at present visiting this country. Mr. H. T. Duffield, Chairman of the Road Haulage Association, was in the chair, and among the guests were Mr. Alfred Barnes, M.P., Minister of Transport, Mr. G. R. Strauss, M.P., Parliamentary Secretary to the Ministry of Transport, Sir Cyril Hurcomb, Chairman, British Transport Commission, Sir Reginald Hill, Deputy-Secretary, Ministry of Transport, and Mr. C. A. Birtchnell, Under-Secretary for Road and Rail Transport.

Mr. Duffield welcomed the members of the Swedish Road Haulage Association, and said that both their Association, and the Road Haulage Association of Great Britain were engaged in an industry which, whenever it had been called on to do a job, had never failed to do it. He went on to introduce the Minister of Transport, Mr. Alfred Barnes, and said that in this country the road haulage industry always had had one complaint against the Government, whatever kind that Government had been. This was that it had changed the Minister of Transport before he had had a chance to learn his job. He wished, however, that the present Minister had indulged in less feverish activity.

The Minister of Transport said that there seemed to be an especially strong mutual attraction between transport people in this country and their opposite numbers in Sweden. Two British delegations had visited Sweden a year ago; one had been organised by the British Road Federation to study road design and construction, and the other by the Institute of Road Transport Engineers. In return, an official delegation from the County Council of Stockholm had come to Britain in the Spring to study traffic problems, and now it was a pleasure to welcome this delegation of Swedish transport operators. This mutual attraction sprang from the desire of both countries to improve their transport systems, and to learn from the experience of others. He understood that the regulations governing the operation of road vehicles in Sweden were based in part on those in Great Britain. This was a compliment, as well as evidence of the value of these exchanges of experience.

In England there was a keen awareness of the importance of road transport. In Sweden, he believed that, before the war at least, road hauliers carried more goods than the railways. He found this fact very interesting, having in mind the long distances to be covered in Sweden. In Great Britain, during the concluding stages of the war, lorries engaged in long-distance movements had carried over a million tons of goods every week. During the war the value had been proved of the great mobility of road vehicles.

Members of the delegation would be aware that road haulage undertakings predominantly engaged in long-distance carriage of goods for hire or reward were to be taken over by the British Transport Commission under the Transport Act. The number of undertakings affected was likely to be about 2,500, operating some 30,000 vehicles, including about 10,000 railway-owned vehicles. There was no suggestion that these undertakings were inefficient. They were to be taken over because this was considered to be the best solution to our problem of road-rail competition.

Mr. C. E. Bystrom, Managing Director of the Swedish Road Haulage Association, thanked those who had acted as hosts to the Swedish delegation for their hospitality in this country. He said that it was always useful to study how other countries lived, and the Swedish delegation had studied not only what the British people had in the way of transport, but what they were going to have in the near future. In Sweden the important principle was that every form of transport should work up to its maximum capacity in relation to other forms of transport. In the case of the road transport industry, this was 99 per cent., and it had been found from practical experience over the past six years that it was a good system to allow the public to have a free choice in the form of transport that it preferred.

Mr. G. Mackenzie Junner proposed the toast of the Chairman, who, he said, was one of the most powerful champions of the road transport industry in this country. He felt that he would have made a very good Minister of Transport, but for the fact that he knew too much about the business, and that, therefore, the appropriate department of the Civil Servants no doubt speedily would have directed him to some other form of activity.

Mr. Duffield responded briefly.

Montreal & Lachine Railroad Centenary

The first railway on the Island of Montreal was the 8-mile line between Montreal and Lachine, which was opened officially on November 19, 1847. It now forms part of the Canadian National Railways system. A trial run had taken place with the first locomotive built for the system on September 18, in the same year, and the centenary of this event was commemorated by ceremonies at Montreal and Lachine on September 18 last.

Viscount Alexander, Governor-General of Canada, opened the centenary proceedings by reviewing the C.N.R. pipe band and the Vimy Patrol of the Canadian Legion at the Central Station, Montreal. The party then proceeded to the Bonaventure Station, which is on the site of the original Montreal & Lachine Railroad terminus, where the Governor-General unveiled a bronze commemorative plaque. Two of the latest C.N.R. buffet-parlour cars were on view at the station, and were named officially *Montreal* and *Lachine* by the mayors of the two cities.

A civic luncheon was held at the Windsor Hotel, Montreal. Mr. R. C. Vaughan, Chairman & President of the C.N.R., formally presented the city with a painting by Mr. A. Sherriff Scott, R.C.A., showing the scene at the opening of the Montreal & Lachine Railroad 100 years ago. Mr. Vaughan recalled that the original 8-mile railway was now part of a system with more than 23,000 miles of track, serving all the nine Provinces in Canada and many States in the American Union as well, and was the largest transport system on the North American Continent.

After the luncheon, a special train conveyed the guests to Lachine, where the Hon. Onesime Gagnon, Provincial

Treasurer, unveiled a cairn erected on the site where the first train arrived in 1847.

Mr. Anatole Carignan, Mayor of Lachine, welcomed the guests at a civic garden party, and acknowledged the generous gift to the city by Mr. Vaughan of a full-size reproduction of the locomotive *Dorchester*, and a small-scale model of a modern C.N.R. train. The *Dorchester* was the first locomotive in Canada, and was imported from England in 1836 to open the Champlain & St. Lawrence Railroad, also now a part of the C.N.R.

In connection with the centenary the C.N.R. has issued an illustrated booklet entitled "Yesterday and Today," in which numerous pictorial comparisons are made between railway accommodation in the nineteenth and twentieth centuries. It includes a plan of Montreal in 1847.

Communications Exhibits at Radiolympia

A large section of the radio exhibition at Olympia, which closes tomorrow, is devoted to communications equipment and industrial applications of electronics. There are several exhibits of V.H.F. mobile installations, including the equipment by the Telecommunication Division of Pye Limited which has been demonstrated in the L.N.E.R. marshalling yard at Whittemoor (see our May 30 issue). The mobile transmitter-receiver in this equipment provides an output of 12 watts on a fixed frequency between 27 and 100 Mc/s. Amplitude modulation is applied to the power-amplifier stage, and provision is made for using the modulating amplifier to operate a loudspeaker. The receiver has

an output of 3 watts, which is adequate to provide loudspeaker reception in a vehicle travelling at speed. Fixed station equipment can be supplied in various forms to meet individual requirements, but consists basically of a 12-watt transmitter and separate receiver, capable of remote operation from two control positions.

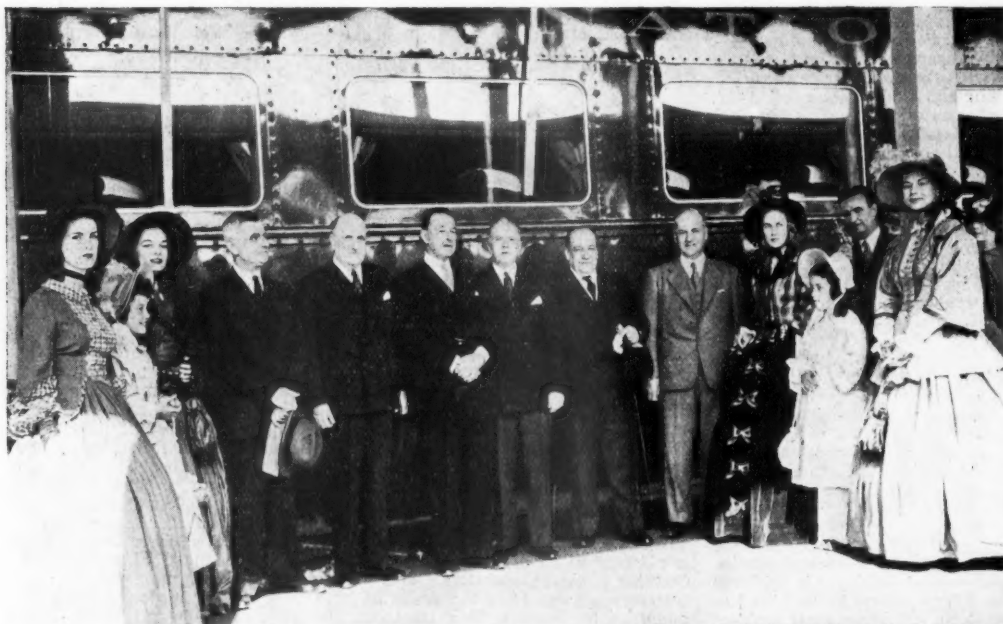
Frequency-modulation of transmitters is being used increasingly for railway applications of radio in the United States, particularly in marshalling yards. Advantages of the system are immunity from atmospheric and electrical interference with reception, and consistency of signal strength irrespective of the screening effects of lineside buildings and other structures.

Demonstrations of frequency-modulated equipment have been given on the L.N.E.R. by the General Electric Co. Ltd. during the past two years. The G.E.C. showed at the exhibition a mobile frequency-modulated installation which already has been adopted extensively by commercial and official users overseas.

Operation takes place normally on one frequency channel in the 30-170 Mc/s range, but provision can be made readily for the use of a second channel, selected by switching. The fixed and mobile transmitters have an output of 20 watts. In this equipment, also, one stage of the mobile transmitter can be used as a public address amplifier.

An interesting electronic item on the G.E.C. stand is a C.R.T. testing bridge for checking mass-produced items against a standard. No technical skill is called for in the manipulator, the process consisting solely in feeding in the articles under test and observing whether or not a straight-line trace is seen on the tube. The test covers metallurgical and chemical as well as dimensional characteristics.

Inspection of New Rolling Stock at Montreal Railway Centenary



Surrounded by models in 1847 dress, the following visitors to the celebrations are seen from left to right: Mayor Carignan, of Lachine; Mr. R. C. Vaughan, Chairman & President, Canadian National Railways; Viscount Alexander, Governor-General of Canada; the Hon. Lionel Chevrier, Minister of Transport; Mayor Camillien Houde, of Montreal; and Mr. J. O. Asselin, Chairman of the Montreal Executive Committee

Centenary of Ashford Works, Southern Railway



War Department "Austerity" locomotives being prepared at Ashford for shipment overseas in the blacked-out erecting shop during the war

This week the Southern Railway is celebrating the centenary of Ashford Works, which were the locomotive, carriage & wagon shops of the former South Eastern Railway. We publish elsewhere this week an editorial article on Ashford history.

The centenary is being celebrated by an exhibition of relics, photographs, and prints covering the history of the works; a display of modern Southern Railway rolling stock; and by periodical showings of cinema films. Members of the public visiting the exhibition are able to make conducted tours of the locomotive and wagon sections of the works. On Wednesday a party was given to children of Ashford employees, and on Thursday the works were visited by members of railway enthusiasts' societies and others interested in history and technical research.

The exhibition was opened on October 6 by Lord de L'Isle and Dudley, V.C. In an introductory speech, Mr. Henry Brooke, Deputy Chairman of the Southern Railway Company, recalled that Lord de L'Isle and Dudley had been awarded the V.C. for his defence of the crossing at Anzio against the whole forces of the enemy.

In declaring the exhibition open, Lord de L'Isle and Dudley said that the railway system of Great Britain had become a national institution, and like all national institutions of which we were proud, we felt at liberty to criticise it, but we did not like other people to do so. The Southern Railway had a great and honourable place in the advance of the technique of railways. It probably was the most closely integrated and closely-knit railway system in the world, and it served the greatest city in the world with immeasurable skill.

An inspection was made of the exhibition in the works canteen. Among the documents of historical interest displayed are an original drawing, signed "Harry S. Wainwright," of a locomotive and train of saloon type coaches for the Folkestone service; and drawings of the "Coffee Pot" vertical boiler locomotive which was completed at Ashford in 1850.

Mr. Henry Brooke presided at the centenary lunch. In welcoming the guests, he expressed the pleasure of the gathering at the presence of Mr. Edward P. Smith, M.P. for Ashford; Major J. F. Ferguson, Chief Constable of Kent; and other representatives of the county. They were delighted, also, to have with them their very

distinguished Works Manager at Ashford, Mr. J. E. Bell.

Mr. Brooke said that they must think not only of the men of Ashford, but also of their wives and families, who by their magnificent loyalty in the home made the work of their menfolk possible.

Mr. Brooke said that he must mention in particular the presence that day of Sir Francis Dent, who had been appointed Chairman of the S.E. & C.R. in 1911, and who was responsible for putting the "kink" at Tonbridge into the hitherto straight stretch of line from Ashford to Redhill. With regard to the future of the Southern Railway system under the Transport Commission, Mr. Brooke said he was sure that the traditions of Ashford would be carried on.

Lord de L'Isle and Dudley proposed the toast of Ashford Works and the Southern Railway. It was not until the railway age that we made those great advances which placed us at the head of the industrial world, and he thought that there was no dispute that the British railways led the world in excellence. There were some critics in high places who made disparaging remarks. He thought it would be a fitting penalty if they were made to spend 24 hours a day for a fortnight travelling about

the railways in other parts of the world. That might lead them to form a better opinion of the railways' physical assets.

No section of our society had a better record over the past 7 or 8 years than the railwaymen; and no railway had a better record than the Southern, for without its organisation it would have been impossible to mount that great invasion of the coast of France. It was by means of the Southern Railway, also, that we received that invasion from the Continent which we hoped would continue. The Southern Railway and Kent gave the first impressions to the foreigner landing on these shores. Surely there could be no finer introduction to England than looking at Kent cut of the windows of a Southern Railway coach.

Mr. O. V. Bulleid, Chief Mechanical Engineer, Southern Railway, in replying to the toast, spoke of the good relations which prevailed at Ashford Works between the management and staff. This spirit would not be disturbed by any forthcoming change of ownership.

DIRECTORS' GIFT TO SPORTS CLUB

At the end of the luncheon, Mr. Henry Brooke thanked Mr. Bulleid for his work and leadership at Ashford, and announced that the directors of the Southern Railway desired to make a personal gift of £250 to the Ashford sports club for the purpose of reconditioning its grounds.

An inspection was made of the locomotive and wagon sections of the works after lunch. Among those present at the opening ceremony were the following:—

Southern Railway: Mr. Henry Brooke, Deputy Chairman; Sir William H. Clark, Sir Francis H. Dent, Sir John E. Thornycroft, Directors; Brigadier L. F. S. Dawes, Secretary; Mr. John Elliot, General Manager; Mr. O. V. Bulleid, Chief Mechanical Engineer; Mr. O. W. Cromwell, Chief Officer for Labour & Establishment; Mr. N. L. Collins, representing Mr. P. Nunn, London (East) Divisional Superintendent; Mr. C. Grasemann, Public Relations & Advertising Officer; Mr. A. B. MacLeod, Stores Superintendent; Mr. J. E. Bell, Works Manager, Ashford; Mr. J. T. Finch, Assistant Works Manager; Mr. P. W. Bollen, Chief Draughtsman; Mr. W. Blyth, Chief Chemist; Mr. A. C. Barton, Chief Clerk.

Other Guests: Major J. F. Ferguson, Chief Constable of Kent; Councillor Geering, Chairman, Ashford Rural District Council; Mr. Edward P. Smith, M.P. for Ashford; Mr. T. A. Ralph, Maidstone & District Motor Services Limited.



The Ashford works band, which during the war broadcast in the B.B.C. "In Town Tonight" programme

Notes and News

Barsi Light Railway Dividend.—A second interim ordinary dividend of $3\frac{1}{2}$ per cent., less tax, has been declared by the directors of the Barsi Light Railway Co. Ltd. for the half-year to March 31 last. No final dividend will be recommended.

New L.N.E.R. Posters.—East Coast Occupations are the subject of a new series of L.N.E.R. posters by Mr. Frank H. Mason, and are entitled The Sail Loft, Boatbuilding, The Trawl Fishers, and The Bait Gatherers. A poster by Mr. Terence Cuneo, Giants Refreshed, shows two express locomotives at Doncaster Works.

Extension of Slough Zone in G.W.R. Zonal Goods Organisation.—As from October 1, Gerrards Cross and Denham have been brought into the G.W.R. zonal scheme. Both stations are absorbed into the zone based on Slough. Gerrards Cross is served direct from the main depot at Slough, and Denham is taken over by Uxbridge, which became a sub-railhead under Slough on October 1.

Road Accidents in August, 1947.—The return issued by the Ministry of Transport of the number of persons reported to have died, or to have been injured, as a result of road accidents in Great Britain during the month of August last, shows 429 deaths (compared with 446 in August, 1946), 3,830 seriously injured (compared with 3,566 in August, 1946), and 13,671 slightly injured (compared with 11,602).

United Railways of Havana Debentures.—It is announced by the United Railways of the Havana & Regla Warehouses Limited, that under Clause 6 of the scheme of arrangement between the company and the holders of its debentures and debenture stocks, investments and cash held by or on behalf of the trustees are to be sold. The proceeds of the sale will be applied towards the redemption and cancellation of the relative debenture stocks by purchasing them on the Stock Exchange. These operations will be effected on or about October 15. The total represented by the investments and cash at present held by or on behalf of the trustees

amounts to £118,096. The stocks concerned are as follow: 5 per cent. irredeemable debenture stock (1906); 4 per cent. debentures and debenture stock; $4\frac{1}{2}$ per cent. Cuban Central debentures to bearer; and $4\frac{1}{2}$ per cent. Western debenture stock.

Effect of Travel Ban on Continental Services.—The new restrictions on foreign pleasure travel, which came into force on October 1, resulted in a considerable diminution of traffic on Southern Railway Continental services. The 8 a.m. train from Victoria to Folkestone carried only 59 passengers, as against 404 the day before. On the Dover-Calais route, there were 133 passengers on the 9.20 a.m. train, as against 377 the previous day; and the "Golden Arrow" had 139 passengers as against 302.

Liverpool Lime Street Station Modernisation.—As part of a comprehensive scheme for modernising Lime Street Station, L.M.S.R., work began on Monday last on the lengthening of five of the eleven platforms. Owing to the fewer platforms available now that this work is in progress, certain adjustments have had to be made to the local passenger service between Lime Street and Alexandra Dock, which includes the temporary closing of Bootle, Balliol Road, and Alexandra Dock Stations, although the latter remains open for parcels and freight services. In addition to lengthening the platforms the Lime Street modernisation includes the provision of a new signal box with a 95-lever power frame controlling all points and signals.

Mexican Railway Co. Ltd.—It is reported from Mexico City that the Mexican Government has completed the purchase of the Mexican Railway Co. Ltd., by making the final payment of ps. 21,500,000. The agreed price of the sale, which took effect as from June 1, 1946, was ps. 41,500,000, and the first instalment of this sum had been paid earlier. Negotiations for the purchase of the railway were opened in 1945, as recorded in our issue of September 21, 1945. Shortly after, the railway was taken over officially on June 1, 1946 (see our June 14, 1946, issue). The board of the Mexican Railway Co. Ltd. then announced that a scheme of dis-

tribution would be submitted to the debenture holders and stockholders as soon as possible.

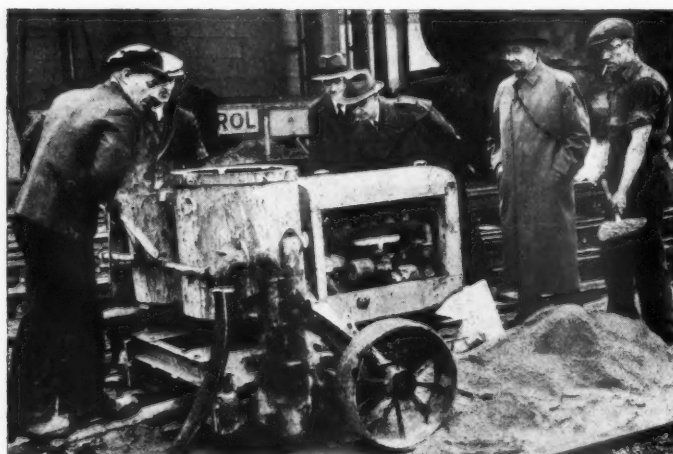
Abridged L.N.E.R. Timetable.—An abridged timetable has been published by the L.N.E.R. to coincide with the alterations to train services which took effect from October 6. This is a reversion to pre-war practice, and its primary object is to save paper, as well as to be more convenient for passengers whose principal journeys are over comparatively short dis-

British and Irish Railway Stocks and Shares

Stocks	Highest 1946	Lowest 1946	Prices	
			Oct. 7, 1947	Rise Fall
G.W.R.				
Cons. Ord.	61½	54½	55	+ 1½
5% Con. Pref.	126½	107	114½	+ 1
5% Red. Pref. (1950) ..	106½	102½	98½	—
5% Rt. Charge	140½	122½	127½	+ 1
5% Cons. Guar.	137½	118½	126½	+ 2
4% Deb.	129½	106	119	+ 1
4½% Deb.	129½	107	119	+ 1
4½% Deb.	130½	114	120½	+ 1
5% Deb.	142½	125	130½	—
2½% Deb.	95½	81½	88½	—
L.M.S.R.				
Ord.	30½	26½	27½	+ ½
4% Pref. (1923)	64	52½	58	+ 1½
4% Pref.	86	75½	78½	+ 1½
5% Red. Pref. (1955) ..	105½	97	96½	+ 1
4% Guar.	108½	100	99	+ 1½
4% Deb.	120	103	109½	+ 1
5% Red. Deb. (1952) ..	108½	105½	101½	—
L.N.E.R.				
5% Pref. Ord.	7	5	6½	+ ½
Def. Ord.	3½	2½	3½	+ ½
4% First Pref.	59½	50½	52½	+ 1½
4% Second Pref.	29½	25½	27	—
5% Red. Pref. (1955) ..	104	97	93½	—
4% First Guar.	107	98	97½	+ 1
4% Second Guar.	101	90	91½	+ 1
3% Deb.	104	87½	95	+ 1
4% Deb.	119½	102½	109	+ 1
4½% Sinking Fund Red. Deb.	107½	101½	98½	—
SOUTHERN				
Pref. Ord.	79½	70	71	+ 1½
Def. Ord.	24	19½	22½	+ ½
5% Pref.	125½	107	113½	+ 1
5% Red. Pref. (1964) ..	115½	106½	105½	+ 1
5% Guar. Pref.	137½	119	126½	+ 2
5% Red. Guar. Pref. (1957)	115½	107½	104½	—
4% Deb.	129½	105½	119	+ 1
5% Deb.	139½	125½	128½	+ 1
4% Red. Deb. (1962- 67)	113½	104½	104½	—
4% Red. Deb. (1970- 80)	115½	104½	105½	+ 1
FORTH BRIDGE				
4% Deb.	109	103	98½	—
4% Guar.	105	102	94½	—
L.P.T.B.				
4½ "A"	133½	120½	121½	—
5% "A"	142½	130½	130½	+ 1
3% Guar. (1967-72) ..	108	98½	95½	—
5% "B"	128½	117½	117½	+ 1
5% "C"	64½	56½	60½	+ 1
MERSEY				
Ord.	34	30	32½	—
3% Perp. Pref.	76	69	68½	+ 1
4% Perp. Deb.	117½	103	106	—
3% Perp. Deb.	98	81	88½	—
IRELAND*				
BELFAST & C.D.				
Ord.	8½	6	7½	—
G. NORTHERN				
Ord.	41½	30½	25½	— 1
Pref.	63½	52	40½	— 2
Guar.	97½	78½	72	—
Deb.	107	97½	95	—
IRISH TRANSPORT				
Common	19½	16½	13½	+ 9d.
3% Deb.	107	100	101	—

* Latest available quotation

Swedish Bridge Experts at St. Pancras, L.M.S.R.



In the centre are Mr. John Bjork, Bridge Manager, Swedish State Railways, and his Assistant, Mr. Sten Reini, inspecting a grouting machine at St. Pancras Station during a recent visit to this country to study British railway engineering developments (See page 376 last week)

OFFICIAL NOTICES

STEEL STRUCTURES purchased, dismantled and removed. Industrial steel structures re-built, re-roofed and renovated. Steel factory buildings dismantled, re-erected or adapted on other sites.—**BELLMAN HANGARS LIMITED**, Terminal House, Grosvenor Gardens, London, S.W.1. Sloane 5259.

SENIOR Indian Government Railway Official. A.M.I.Mech.E., A.F.R.Ac.S., A.M.I.Loco.E., 52, at present in London, desires working directorship, partnership or appointment in a few months' time. Wide works and sales experience in England before appointment in India. Many years buying and an intimate knowledge of the Indian market as well as administration and control of staff, etc.—Box 193, *The Railway Gazette*, 33, Tothill Street, Westminster, London, S.W.1.

TRANSPORT ADMINISTRATION IN TROPICAL DEPENDENCIES. By George V. O. Bulkeley, C.B.E., M.I.Mech.E. With chapters on Finance, Accounting and Statistical Method. In collaboration with Ernest J. Smith, F.C.I.S., formerly Chief Accountant, Nigerian Government Railway. 190 pages Medium 8vo. Full cloth. Price 20s. By post 20s. 6d.

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tances. The new book will be mainly a reproduction of part of the all-line timetable covering the area concerned, and will be published at 3d. under the title of "L.N.E.R. Passenger Services—Yorkshire, Durham, Northumberland."

London Transport Art Group.—Works by members of the London Transport staff are on show at an exhibition being held by the London Transport Art Group at 55, Broadway, Westminster, S.W.1. The exhibition is open until October 11 between 10 a.m. and 8 p.m., and includes water colours, pen and ink drawings, oil paintings, and modelling.

Leyland Buses for Scotland.—Orders placed with Leyland Motors Limited by the Scottish Motor Traction Company now total more than 1,000 post-war vehicles. Two companies in the group, W. Alexander & Sons Ltd. and the Central S.M.T. Company, recently have placed additional orders for 130 Leyland single-deck chassis and 85 complete Lowbridge double-deckers respectively. Of the 1,000 vehicles on order, over half are double-decker units, and more than 600 of these vehicles will be fitted with 125-h.p. diesel engines and Leyland quick-change synchromesh gearboxes.

Steel Company of Wales.—A scheme for the further modernisation of the South Wales sheet and tinplate industry, which was described in our issue of March 7 last, has been carried into further practical effect by an agreement entered into by Guest Keen Baldwins Iron & Steel Co. Ltd. to transfer to the Steel Company of Wales the undertakings which it carries on at Port Talbot and Margam Works and Cornelly Quay. The transferred undertakings are being carried on by the Steel Company of Wales, which was registered on May 1 this year, as from September 27, 1947, on which date the various works, plant, machinery, goodwill, etc., were vested in the latter company. The business of Guest Keen Baldwins Iron & Steel Co. Ltd. at East Moors Works, Cardiff, and at Dowlais will continue to be carried on as heretofore.

Prefabricated Station Experiments, L.M.S.R.—In our issue of March 8, 1946, was described and illustrated an experimental prefabricated station erected by the L.M.S.R. at Queens Park, under the direction of Mr. W. H. Hamlyn, F.R.I.B.A. Tests have been carried out since to find out whether such buildings are entirely satisfactory as regards resistance to vibration and the performance of the materials from which they are constructed. These tests showed the principle of prefabrication to be fully justified, and, therefore, the L.M.S.R. decided to erect another small station, that at Marsh Land and Strand Road on the electrified line between Liverpool and Southport, of prefabricated material. One section of this station, which replaces one destroyed by fire some

time ago, has been completed, and when finished it was found that the whole of the work could be carried out to a strict timetable.

Collision at Chelmsford, L.N.E.R.—While the 7.13 a.m. train to London Liverpool Street was standing at Chelmsford Station on October 7, a light engine coming from a siding collided with it in the rear. Passengers in the last coach were injured, some of them by flying glass. Doors were torn off by the impact, and damage was done to the guard's compartment. Of the 19 passengers injured, 6 were taken to hospital, but only one was detained.

Naming of L.N.E.R. "Master Cutler" Express.—Before its inaugural journey to Marylebone on October 6, the L.N.E.R. 7.40 a.m. express from Sheffield was named officially the "Master Cutler" by Mr. R. A. Balfour, the present Master Cutler of Sheffield. Mr. Balfour unveiled one of the four stainless-steel nameplates which have been presented by the Cutler's Company to the L.N.E.R. for display on the locomotives working the train. After the ceremony, Mr. Balfour travelled to Marylebone on the footplate.

Train-Ferry Resumption Announced in Paris.—The French National Railways Company has announced that the passenger train-ferry service between Dover and Dunkirk will be restored on December 1. A through train of second class sleeping cars will run nightly between London and Paris. Departure from the Gare du Nord, Paris, will be at 8.30 p.m., and the train will reach Victoria at 9.10 a.m. The return service, also, will leave Victoria at 8.30 p.m., and will be due to reach Paris at 9.30 a.m.

G.W.R. and Southern Joint Zonal Scheme at Reading.—Pursuing the general policy adopted by the British railways for the development of inter-railway zonal collection and delivery services, where the interests of two or more railway companies overlap, the G.W.R. and Southern Railway announce the introduction at Reading, G.W.R., of a joint scheme, which has been operating as from October 1. Twelve months ago the G.W.R. instituted a domestic zonal scheme with Reading as the railhead and sub-railheads at Henley-on-Thames, Maidenhead, Newbury and Wokingford. Three additional railheads now have been brought in as follows:—

Camberley, Southern Railway, absorbing Bagshot, Blackwater (Hants), and Frimley.
Wokingham, Southern Railway, absorbing Bracknell and Crowthorne.

High Wycombe, G.W.R. & L.N.E.R., will be the third new sub-railhead and will serve an area previously covered from Princes Risborough, Saunderton, West Wycombe, Beaconsfield, Loudwater and Woodburn Green.

Altogether, the area coming under the Reading zonal scheme will be 680 square miles. In effect, therefore, the Reading zonal scheme becomes a 3-company organisation, the first of its kind in Eng-

land. Concurrently with the introduction of this scheme, the freight interests of the G.W.R. and Southern Railway at Reading are fused at the G.W.R. depot. All freight traffic in future will be dealt with at that station.

Revised Workmen's Ticket Arrangements for Staggered Hours.—The arrangements for the issue of workmen's tickets on the main-line railway services and the railway, tramway, and trolleybus services of the London Passenger Transport Board have been reviewed in the light of the proposed re-arrangement of hours of work in industry. As from October 20, workmen's tickets will be issued on the above services on weekdays to holders who are required to travel between the time when the issue of workmen's tickets normally ceases and 12 noon. For this purpose a special card of identity will be necessary, obtainable by the employer from the railway concerned or the London Passenger Transport Board.

Extension of "Enterprise Scotland" Exhibition.—It is announced that this exhibition will close on October 18 instead of September 30 as was intended originally. Sir Steven Bilsland, Chairman of the Committee, stated in Edinburgh on October 2 that the organisers were more than satisfied at the support given by the public, and that so far the takings from all sources totalled £40,299. It had been estimated in the first place that 200,000 people would attend, but already, with two weeks still to go before the doors finally closed, more than 370,000 had passed through the turnstiles. The organisers were certain now of doubling their original estimate.

London Transport Coach Hire Negotiations.—The London Passenger Transport Board is taking special steps towards easing traffic conditions for Londoners this winter. Active negotiations are in progress with the Passenger Vehicle Operators' Association to hire coaches which will be used to supplement bus services. If the plan is put into operation, 350 coaches will be available to run on ordinary bus routes in Central London. The step is being taken because of the non-delivery of large orders placed by the Board for new buses, as a result of national vehicle supply shortage. London Transport has 2,500 buses on order, only a handful of which have been delivered so far. Some hundreds of existing vehicles are off the roads daily because of the acute shortage of spare parts.

Forthcoming Meetings

October 20 (Mon.).—The Permanent Way Institution (London Section), at Denison House, Vauxhall Bridge Road, London, S.W.1. 6.30 p.m. "Flat Bottom Track," by Mr. H. Ormiston, B.Sc., A.M.I.C.E. (L.N.E.R.).

Railway Stock Market

With uncertainty in stock markets increasing, prices in most sections have been moving narrowly, buying interest again being at a low ebb, although selling was very moderate. It is apparent that investors generally are perplexed, but there is little selling, the prevailing tendency being to await developments. British Funds attracted a larger volume of business, and with sellers predominating, prices moved back earlier in the week.

Industrials were generally well maintained, but buying of export trade shares was on a smaller scale, it being widely recognised that it will be impossible to form any definite view of dividend prospects of individual companies until it is known whether there is to be another Budget next month with some new device for limiting profits. It is felt in the City, however, that in this connection a general increase in N.D.C. would bear very unfairly on many companies which are confined to the home market; whereas an increase in the tax on profits distributed in dividend in the circumstances could come in for little criticism, as it would bear mainly on companies which in order to achieve export targets will have prior claims to materials and labour.

Iron and steel shares provided a good section. Buyers were attracted by the good yields and by the assumption that nationalisation may be postponed because it would prove a very unpopular measure and would have little excuse if it is possible to continue the upward trend in output over the next few months. It is realised, however, that this may turn mainly on the fuel position. United Steel strengthened in response to the higher profits and maintained 8 per cent. dividend, while John Summers

rose to 29s. 9d. after the 2½ per cent. interim dividend, and Neepsend Steel improved to 33s. 9d. awaiting the dividend announcement.

Elsewhere Vulcan Foundry have been firm at 30s., with North British Locomotive 25s. 3d. and Beyer Peacock 23s. 4½d. Stephenson Hawthorns 5s. shares changed hands around 6s. 3d., and Charles Roberts remained active and higher, dealing being recorded over £63.

The uncertainty surrounding stock markets again tended to attract somewhat more attention to home rails in view of the protection afforded by their "take-over" prices; and where changed, moderate gains have been recorded. There seems little doubt, nevertheless, that sentiment has been affected to some extent by a new suggestion current in the City, which, however, is not regarded seriously in responsible quarters. The suggestion is that there might be two forms of British Transport stock, namely, a 3 per cent. long-dated issue carrying 3 per cent. interest, and a short-dated issue with interest at only 2½ per cent., and that home railway stockholders would have the choice of exchanging into either of these.

Nevertheless, although this suggestion is ingenious and might be regarded favourably by some stockholders and also by Mr. Dalton, it would be complicated, and presumably stockholders would have to notify their preference for a long-dated or short-dated stock before January 1 next, the date scheduled for the exchange into British Transport. No doubt if it were possible for British Transport stock to carry only 2½ per cent. interest it would be in line with the Government's original intentions. The higher the rate of interest.

the less satisfactory will be the financial results of nationalisation, but the Transport Act definitely stipulates that British Transport stock terms must be in unison with those ruling in the gilt-edged market.

A point sometimes overlooked is that whatever the rate of interest on British Transport stock, the take-over prices are fixed for each particular home railway stock. Although it is not unlikely that British Funds will record good improvement between now and the end of the year, it is extremely doubtful if 2½ per cent. Consols and 2½ per cent. Treasury Bonds could reach par, which would have to be the case for Transport stock to carry interest at only 2½ per cent. The prevailing view is that if, as seems probable, there is another Budget next month, Mr. Dalton is unlikely to make any announcement in regard to the terms of British Transport stock until after the Budget proposals.

Foreign rails have reflected a waiting attitude with small declines predominating. Argentine rails turned easier awaiting definite news from Buenos Aires as to when the railway agreement will be ratified. Buyers were still holding off, despite the attractions of the 4 per cent. debentures of the leading companies, which are approximately 8 points below their share-out levels. Central Uruguay second debentures attracted some attention at the slightly higher level of 63½. San Paulo rallied, but later eased pending definite news as to when the compensation money will be handed over by Brazil, and other Brazil rails moved with San Paulo. United of Havana 1906 debentures, after rising on the announcement of the sum available for purchase of stock by the company in the market, came back to 18½.

Traffic Table and Stock Prices of Overseas and Foreign Railways

	Railways	Miles open	Week ended	Traffic for week		No. of Week	Aggregate traffic to date			Shares or Stock	Prices		
				Total this year	Inc. or dec. compared with 1945/46		Totals		Increase or decrease		Highest 1946	Lowest 1946	Oct. 7, 1947
							1946/7	1945/6					
South & Central America	Antofagasta ...	834	28.9.47	£ 55,210	+ 10,050	39	£ 1,623,840	£ 1,277,660	+ 346,180	Ord. Stk.	11	10½	11
	Arg. N.E. ...	753	27.9.47	ps. 353,900	+ ps. 21,200	13	ps. 4,184,700	ps. 4,108,700	+ ps. 76,000		17	5	10
	Bolivar ...	174	Aug., 1947	\$99,656	+ \$1,217	35	\$872,836	\$860,897	+ \$11,939	6 p.c. Deb.	6½	5½	22½
	Brazil ...									Bonds	30	26	43½
	B.A. Pacific ...	2,771	27.9.47	ps. 2,650,000	+ ps. 350,000	13	ps. 32,225,000	ps. 27,588,000	+ ps. 4,637,000	Ord. Stk.	8½	5½	10
	B.A.G.S. ...	5,080	27.9.47	ps. 3,128,000	+ ps. 416,000	13	ps. 42,714,000	ps. 42,600,000	+ ps. 114,000	Ord. Stk.	16	10½	16
	B.A. Western ...	1,924	27.9.47	ps. 1,484,000	+ ps. 455,000	13	ps. 17,819,000	ps. 15,381,000	+ ps. 2,438,000	"	19	9½	20½
	Cent. Argentine Do. ...	3,700	27.9.47	ps. 3,452,670	+ ps. 403,670	13	ps. 42,251,770	ps. 40,413,440	+ ps. 1,838,330	"	10½	7½	17
	Cent. Uruguay ...	970	27.9.47	29,205	+ 7,158	13	405,866	454,628	+ 48,762	Ord. Stk.	8½	3½	21½
	Costa Rica ...	262	Aug., 1947	30,665	+ 1,689	9	63,523	58,650	+ 4,873	Ord. Stk.	15	12	9
	Dorada ...	70	Aug., 1947	31,100	+ 4,300	35	243,900	256,775	+ 12,875	1 Mt. Deb.	102½	99½	108
	Entre Rios ...	808	27.9.47	ps. 452,900	+ ps. 47,700	13	ps. 5,702,100	ps. 5,472,700	+ ps. 229,400	Ord. Stk.	9	5½	10
	G.W. of Brazil	1,030	27.9.47	34,900	+ 2,300	39	1,218,500	1,068,100	+ 150,400	Ord. Stk.	26.6	20	3
	Inter. Ctl. Amer.	794	Aug., 1947	\$1,049,057	+ \$217,646	35	\$9,012,068	\$7,303,649	+ \$1,708,419	"			
	La Guaira ...	22½	Sept., 1947	\$105,861	+ 89,279	39	\$988,095	\$1,059,566	+ \$71,471	5 p.c. Deb.	70	58	83½
	Leopoldina ...	1,918	27.9.47	78,228	+ 13,078	39	2,589,954	2,306,875	+ 283,079	Ord. Stk.	5	3½	14½
	Mexican ...	483	31.5.47	ps. 1,464,000	+ ps. 459,100	22	ps. 7,706,200	ps. 13,441,600	+ ps. 5,735,400	Ord. Stk.	1½	4	8
	Midland Uruguay	319	Aug. 1947	16,601	+ 4,384	9	32,448	39,969	+ 7,521	Ord. Sh.	83/9	71/3	63/9
	Nitrate ...	382	30.9.47	8,242	+ 4,463	39	172,554	154,480	+ 18,074	"			
	N.W. of Uruguay	113	Aug. 1947	3,791	+ 3,087	9	7,778	11,581	+ 3,803	"			
	Paraguay Cent.	274	26.9.47	£73,394	+ £12,240	13	£662,574	£787,229	+ £124,655	Pr. Li. Stk.	78½	60	44½
	Peru Corp. ...	1,059	Sept., 1947	185,580	+ 29,801	13	517,763	476,463	+ 41,300	Pr. Pref.	16½	8½	8
	Salvador ...	100	July, 1947	c75,000	+ c7,000	4	c75,000	c82,000	+ c7,000	"			
	San Paulo ...	153½								Ord. Stk.	119½	52½	158
	Taitai ...	156	Aug., 1947	5,420	+ 2,165	9	11,005	7,050	+ 3,955	Ord. Sh.	22.6	15.3	20
	United of Havana	1,301	6.9.47	57,974	+ 12,420	10	597,603	541,437	+ 56,166	Ord. Stk.	2	1½	2
	Uruguay Northern	73	Aug., 1947	1,111	+ 365	9	16,700	19,939	+ 3,239	"			
	Canada	Canadian National	23,535	Aug., 1947	9,254,750	+ 482,750	34	71,822,500	63,922,500	+ 7,899,750	"		
Canadian Pacific		17,037	Aug. 1947	6,652,500	+ 348,000	35	51,289,000	47,182,000	+ 4,107,000	Ord. Stk.	25½	16½	18½
Various	Barsi Light ...	202	Aug., 1947	24,247	+ 4,642	22	138,577	129,315	+ 9,262	Ord. Stk.	123½	111	110½
	Beira ...	204	July, 1947	98,525	+ 7,271	41	927,422	767,420	+ 160,002	"			
	Egyptian Delta	607	20.8.47	14,458	+ 1,876	20	225,128	233,110	+ 7,982	Pr. Sh.	9½	5	6
	Manila ...									B. Deb.	75	60	72½
	Mid. of W. Australia ...	277	Aug., 1947	20,028	+ 4,576	9	37,716	29,947	+ 7,769	Inc. Deb.	85	70	74½
	Nigeria ...	1,900	July, 1947	296,272	+ 73,139	17	1,339,004	1,490,315	+ 151,311	"			
	Rhodesia ...	2,445	July, 1947	579,717	+ 30,734	41	5,558,202	5,149,365	+ 408,837	"			
	South African	13,323	6.9.47	1,274,352	+ 125,938	23	28,177,389	25,022,597	+ 3,154,792	"			
	Victoria ...	4,774	May, 1947	989,352	+ 361,928	48				"			

† Receipts are calculated @ 1s. 6d. to the rupee